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BUREAU OF HYGIENE AND TROPICAL DISEASES

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SUMMARY OF RECENT ABSTRACTS *

IX. LEPROSY †

General

A volume containing abstracts of the 6th International congress of Leprology, Madrid, 1943 (p. 802), has been published. The subjects discussed included classification, treatment, immunology and epidemiology. For treatment, thiosemicarbazone was advocated as an alternative to the sulphones, but isoniazid, cortisone, corticotrophin and streptomycin were not generally recommended without further tests. This Congress is also described in a special issue of the *International Journal of Leprosy* (p. 933), in which 8 of the papers are given in full or only slightly abridged, and 166 are listed.

A monograph on the modern concepts of leprosy has been published by Arnold (p. 593) who is a dermatologist writing for dermatologists.

Classification

The Draft Report of the Technical Committees of the 6th International Congress of Leprosy (p. 592) sets out the classification adopted:—*Lepromatous* (macular, diffuse, infiltrated, nodular, neuritic), *Tuberculoid* (macular, minor, major, neuritic), *Indeterminate* (macular, neuritic), *Borderline*. This classification is also accepted by the WHO Expert Committee on Leprosy (p. 270).

The classification proposed by Dharmendra and Chatterji (p. 273) comprises *Nonlepromatous* forms (tuberculoid, maculo-anaesthetic and polyneuritic), *Intermediate* (borderline and indeterminate), and *Lepromatous* forms.

Discussing the classification agreed at the third Pan-American Conference, Fernandez (p. 273) points out that the indeterminate form is often hard to recognize without histological examination, and that every case should be regarded as indeterminate if it cannot confidently be classed as lepromatous or tuberculoid from clinical signs. Borderline cases are considered as

* The information from which this series of summaries has been compiled is given in the abstracts which have appeared in the *Tropical Diseases Bulletin*, 1954, v. 51. References to the abstracts are given under the names of the authors quoted and the pages on which the abstracts are printed.

† For previous articles on leprosy in this series see the November issues of the *Tropical Diseases Bulletin* each year since 1939.

reactional episodes and are divided according to their original form as lepromatous, tuberculoid or indeterminate.

Montestruc (pp. 274, 803) considers that the haemagglutination reaction should be used in classification, along with the other criteria. The haemagglutination and haemolytic titres are highest in lepromatous forms and lowest in indeterminate, and the titres diminish as patients improve under treatment.

Geographical Distribution

Littann (p. 594) has written an article on the use of maps to show the incidence of leprosy, and of its forms, the distribution of control stations, and other information, and the American Geographical Society (p. 272) has issued a coloured map of the world distribution of leprosy as it was known in 1952.

Leprosy exists in coastal regions of Italy, where there is much maritime traffic, and there are 4 special pavilions at different places for isolation; Traversa (p. 943) states that financial aid is proposed for patients and their families during the period of hospital residence. Markianos (p. 272) points out that there are several foci of leprosy in Greece, the chief of which are in Attica and the Aegean islands.

Leprosy is not uncommon in the Berber tribesmen of Morocco, and is often a familial disease (Cornibert, p. 595).

Rogers (p. 600) sums up the incidence and control of leprosy in East Africa, stressing the importance of early treatment with hydnocarpates and sulphones. An account of leprosy in the Sudan and in East and Central Africa, as seen in a tour of those countries, is given by Cochrane (p. 490). Innes (pp. 490, 936) in East Africa found a high proportion of children with leprosy (21 per cent. of 7,072 patients diagnosed), of whom one fifth had lepromatous disease. The indication is that the disease is active and spreading in these communities.

Laviron and Lauret (p. 489) discuss leprosy in children in French West Africa. Contact children are in special danger, but when endemicity is high the danger of infection outside the family is also high. Only 10–15 per cent. of cases are lepromatous, the rest being tuberculoid or indeterminate.

The incidence of leprosy in Portuguese Guinea was found by Leite *et al.* (p. 936) to be about 25·7 per 1000, and 10 per cent. of these persons were infective. It is proposed to admit the infective patients to an agricultural leprosy colony, and to treat the others as out-patients at various centres. An account of leprosy in Spanish Guinea is given in a monograph by Martínez Domínguez (p. 935), who shows that the incidence on the mainland (35 per 1000) is considerably higher than on the islands, and that on the mainland the more resistant tuberculoid form is more common than on the islands. He discusses these features in terms of immunity and hypersensitivity, and the importance of density of population and the standard of sanitation in the epidemiology of the disease.

A general account of leprosy in the Belgian Congo has been written by Gillet (p. 1067).

Sloan (p. 1253) found 525 cases of leprosy in a survey of 16,882 persons in Netherlands New Guinea, and 223 cases in 4,924 examined in the Trust Territory of the Pacific Islands.

In an account of the leprosy hospital at Makogai, Fiji, Griffiths (p. 1253) comments that there is evidence that the incidence of the disease has fallen considerably since the beginning of the century, especially in Indians. He notes that since the effect of the sulphones (and thiacetazone in those who react badly to the sulphones) is so obviously beneficial, the spirit of the

patients remains high. Similarly, in the Cook Islands leprosy patients since 1926 have been sent to Makogai, and in the northern islands the incidence has fallen considerably, but NUMA (p. 272) points out that this is not the case in the southern group, where an apparent increase in incidence causes some anxiety.

The incidence of leprosy appears to be increasing in the aborigines of Australia. SLOMAN (p. 272) states that a recent survey showed the rate to be 56 per 1,000. He comments on the disease in New Guinea.

GONZÁLEZ PRENDES (p. 1067) estimates that the incidence of leprosy has increased 400 per cent. in the Antilles since 1900.

An account of leprosy in the state of Calima, Mexico, is given by NUÑEZ ANDRADE (p. 391), who estimates that there were over 2,000 cases in a population of 120,653.

At a conference of Brazilian leprologists reported in the *Arquivos Mineiros de Leprologia* (p. 934) the point was made that the incidence of the disease in Brazil is increasing, and that 60 per cent. of the notified cases are infectious. Half of the known patients are not under effective control. Reference is made to the conditions of work of doctors and the importance of attracting more into this field. Dispensaries are regarded as the best prophylactic units.

Contact Infection

The importance of family contact has been emphasized by several writers. A case of this kind contracted in France is reported by MONTEL (p. 937).

FIGUEREDO (p. 595) has examined child contacts in Bombay, and concludes that it is not possible to support the view that "neural cases negative to routine methods of examination" are non-infective, and quotes instances of infection apparently acquired from such persons. But in comment Muir makes the point that the term "neural" is not clearly defined, and that the cases referred to may have included some—indeterminate, reacting tuberculoid, for instance—in which bacilli may have been present. In the older classification the neural group included such cases. It is necessary to define terms more accurately before this opinion can be accepted.

An early case of leprosy in an infant 2 months old is described by MONTESTRUC (p. 803), who notes that the parents were healthy, but the father's sister had leprosy with nodules rich in bacilli. The danger of familial infection is clear. DREISBACH (p. 1068) reports leprosy in a child aged 7 months.

In a group of contacts observed in Brazil for up to 18 years, 15 per 1,000 have developed the disease (QUAGLIATO, p. 595).

Aetiology

In a study by electron microscopy of leprosy bacilli during treatment with sulphones, MALFATTI and JONQUIERES (p. 493) found that the peripheral envelope surrounding the isolated bacillary units and globi tend to disappear as the vitality and virulence of the bacilli become less. This permits direct contact with the bacilli, and facilitates the production of natural antibodies.

SANCHEZ (p. 490) has used with success the silver-stain method for demonstration of *Myco. leprae*. AZULAY and ANDRADE (p. 1254) found the Wade modification of the Ziehl-Klingmüller technique better than the original for demonstrating *Myco. leprae* in tissue sections.

CHAUSSINAND and TOUMANOFF (p. 495) describe the fate of human leprosy bacilli injected (as a suspension of leproma tissue) into guineapigs. The reaction is an exudate containing polymorphonuclear cells and monocytes,

and the authors consider that the natural immunity of these animals is due to their power of phagocytosis of the bacilli. In a review of recent animal inoculation studies with human and murine leprosy bacilli, TANIMURA and NISHIMURA (p. 495) show that all attempts to infect rats, guineapigs, rabbits and hamsters with human leprosy bacilli failed. They describe the phagocytosis and fate of murine leprosy bacilli. A study of the histological differences between infections with human and murine leprosy bacilli is reported by SHIMIZU (p. 596); some details are given in the author's summary.

BLANC *et al.* (p. 804) cultivated an acid-fast bacillus from a leprous patient: it is not the leprosy bacillus, as a killed suspension, injected intradermally, gives a reaction in lepromatous leprosy. Mitsuda-negative patients tend to become Mitsuda-positive after injection of this organism.

Pathology

BALASUBRAHMANYAN *et al.* (p. 1068) describe an improved histological method for examination of cutaneous nerves in leprosy; for technique the original should be consulted.

FERRAND (p. 941) performed liver biopsy in leprosy and found leprous nodules with masses of bacilli in the Kupffer cells but not in the hepatic cells; there was infiltration of histiocytes and of lymphocytes and monocytes. This method of examination is safe if precautions are taken, and is preferable to puncture of the sternum or testicle. Heavy deposits of iron were found in the liver in leprosy by LLOMBART and ALCACER (p. 938).

In a study of the lymph glands in leprosy FURNISS (p. 274) makes the point that gland puncture for early diagnosis is not recommended, as the bacilli can be found earlier in the skin. The glands may act as a reservoir for residual bacilli, and may thus lead to relapse of the disease.

In an account of leprosy in Jamaica DE MONTAIGNE (p. 273) remarks that ocular involvement may often be the first indication of the disease (though in comment Muir states that the skin usually becomes positive first).

In leprous neuritis MARIANO (p. 941) found the ulnar nerve most commonly affected, and next the external popliteal.

In a discussion of osseous changes in neural leprosy, BARNETSON (p. 274) suggests that the fundamental factor is failure of reflex vasomotor response, owing to destruction of vasomotor fibres by leprous peripheral neuritis.

Reporting a case of cancerous change in a leprosy lesion, WAALER (p. 805) comments that the association is rare.

Serum proteins are normal in leprosy except in far-advanced lepromatous cases and during the lepra reaction, when they are increased, especially the gamma globulin (ISHIHARA, p. 275).

Tests

MITSUDA (p. 491) has issued a translation into English of his original paper, published in Japanese in 1919, on the lepromin reaction.

When lepromin is injected intradermally into guineapigs and rats the reaction in the guineapigs resembles the tuberculoid form of leprosy in man, and in rats the lepromatous form. HADLER (p. 701) suggests by analogy that, in man, destruction of bacilli and the type of tissue reaction depend to a great extent on natural resistance to leprosy. MARKIANOS (p. 804) suggests that an injection of lepromin may precipitate the appearance of previously latent leprosy. He quotes the case of a child of 22 months.

The Mitsuda antigen is normally used at a dilution of 1 in 30, but FLOCH (p. 1068) has demonstrated that it can be used in dilutions up to 1 in 500

with little difference in result. Difficulty in standardizing the antigen is therefore not of great significance.

Schujman (p. 491) writes of the value of the lepromin test in diagnosis, pointing out that when there are no skin manifestations, and bacteriological and histological examinations are not available, the use of the test may indicate towards which of the polar types the case is moving. He (p. 1254) defines the (early) Fernandez reaction to lepromin as allergic in nature, and different from the (late) Mitsuda reaction which is an expression of immunity. The immunity may be found in normal persons and is not necessarily the result of previous contact with *Myco. leprae* or other acid-fast organisms. The positive Fernandez reaction can be obtained only in Mitsuda-positive persons, but a Mitsuda-positive person may be Fernandez-negative.

In a study of the lepromin test in contacts, de Menezes (p. 698) found it positive in 88·6 per cent. of contacts of lepromatous patients, and in 100 per cent. of contacts of patients with other forms. This may indicate that constant superinfection (as in the contacts of the lepromatous group) may lead to conversion of positive to negative reactions.

It is now well known that some persons who have never been in contact with leprosy patients give positive results to the lepromin test. de Mesquita (p. 1255), for instance, tested 80 marines (73 of whom were fresh from Holland) with lepromin, and 10 gave positive Fernandez (early) reactions and 31 positive Mitsuda (late) reactions. The author thinks that this proportion of positive results is below the average in healthy persons elsewhere. Similarly, positive lepromin reactions (early and late) were found in clinically healthy persons in Surinam by Gehr and Munder (p. 1255). The lowest proportion was in non-contact S. American Indians; other groups included contacts.

Quoting an investigation on children in the United States, away from leprosy infection, Azulay (p. 939) finds that a positive lepromin test can be induced by virulent *Myco. tuberculosis* and by BCG. The late reaction is an index of protection against leprosy, and this is particularly influenced by BCG; the early reaction is allergic.

A test has been devised by Magarão and Lima (p. 278) for estimating prognosis in patients with both leprosy and tuberculosis. They inject BCG intradermally, and they find that those in whom a nodule 8 mm. in diameter is evident after 4–6 weeks tend to have a better prognosis than those without a nodule. In lepromatous patients negative to both lepromin and tuberculin, Lowe and McNulty (p. 279) injected BCG intradermally; most responded to tuberculin later and over 11·5 per cent. became positive to lepromin, but this result was usually only temporary. The authors proposed to investigate the effect of repeated oral doses on prognosis in such patients.

Floch (p. 279) prepared from BCG an antigen similar to the lepromin antigen, and compared the results when the two antigens were injected into leprous patients; these results agreed in 98·7 per cent. He thinks that the Mitsuda reaction is not different from the allergic tuberculous reactions, and discusses the mechanisms of the lepromin reaction. Tubercle and leprosy bacilli are able to provoke cross reactions of allergy and partial immunity.

Hadler (p. 1257) injected BCG and lepromin into guineapigs and studied the lesions, which could be divided into two phases—the macrophage phase and the epithelioid-cell phase. These differed with the two injections, but they explain the two types of histological picture in leprosy, namely the lepromatous in which the macrophages are unable to destroy the bacilli, and the tuberculoid in which the bacilli are destroyed and epithelioid cells are formed.

Hadler and Zitti (p. 1258) inoculated guineapigs with *Myco. leprae*,

Myco. leprae murium and BCG, and tested them with tuberculin later. Both types of leprosy organisms sensitized the animals, but *Myco. leprae murium* was the more potent, equalling BCG.

Sagher (p. 938) injected living BCG or *Leishmania tropica* into the skin of lepromatous patients, and the resulting lesions were lepromatous or prelepromatous in form. This type of reaction of histological development of a granuloma characteristic of the host's altered tissue, in response to injected specific living organisms, has been called an isopathic phenomenon. Sagher *et al.* (p. 67) tested leprosy patients with tuberculin and examined biopsy specimens from the area of the tests at intervals. In all instances they found nests of foam cells or granulomatous structures resembling lepromatous leprosy.

In hypopigmented leprosy macules, injection of 1 in 100,000 aqueous nicotine picrate fails to produce "gooseflesh" and sweating, as in normal skin; Arnold (p. 276) uses this as a diagnostic aid in doubtful cases.

When mecholyl chloride (a substance similar to acetylcholine) is injected into the normal skin, or introduced by means of an electric current, it produces profuse local sweating, erythema and formication. Cossermelli and da Silva (p. 597) have used this as a test in various forms of leprosy, and have found it useful in differential diagnosis and in estimating the results of treatment.

Montestruc (p. 391) has obtained positive results in lepromatous and tuberculoid leprosy with the haemagglutination and conditioned haemolysis reactions with tuberculin or a fraction of it as antigen. He claims antigenic affinity between tubercle and leprosy bacilli, and relates this to the use of BCG for immunization against leprosy. In lepromatous leprosy Floch and Sohier (p. 804) found the haemagglutination test positive in 64·5 per cent., in tuberculoid in 25·9 per cent., and in indeterminate in 22·8 per cent.; they suggest that it might be useful in diagnosis and prognosis. Plissier and Secret (p. 597) also have found the haemagglutination reaction useful in evaluating progress under treatment. Viette (p. 491), however, though finding the haemagglutination and conditioned haemolysis tests most strongly positive in lepromatous leprosy, and least in tuberculoid, does not consider the reactions useful in diagnosis, or in classification.

False positive serological tests for syphilis are probably due to a similarity in antigenic nature between the lipoids of leprosy bacilli and those of the heart extract. Narula and Gupta (p. 492) found fewer false positives with the Meinicke than with the VDRL reaction, and discuss the possible reasons for this. Floch and Sureau (p. 804) have examined the Kahn universal reaction in leprosy, but have not found that it gives a characteristic result. The treponema immobilization test is regarded as specific, and is useful for detecting false positive serum tests for syphilis in leprosy (Rollier and Pelbois, p. 597; Vilanova and Catasús, p. 941).

In a series of tests of leprous patients with histoplasmin, de Mesquita and Collier (p. 275) found a slightly lower incidence of positive results than in controls, and conclude that leprosy affords a slight degree of protection against histoplasmosis.

Treatment

Sulphones

The first report of the WHO Expert Committee on Leprosy (p. 270) deals with many sides of the problem. For the control of the disease mass treatment with DDS is advocated, together with the use of BCG and improvement of general health. Thiosemicarbazone is not considered suitable for mass treatment, but is useful in certain circumstances.

In an analysis of Nigerian patients whose treatment with sulphones began 6–8 years previously, Lowe (p. 1255) remarks that the study revealed the main weakness of the treatment, namely the extreme slowness of its action, but it revealed also its strength, namely the sureness of its action and the permanence of results in most cases. Sulphone treatment is a major revolution in the treatment of leprosy.

Treatment with DDS often leads at first to a slight reduction in erythrocytes and haemoglobin; Dharmendra and Chatterji (p. 276) could not prevent this by using very small doses at first. By a technique which involved intraperitoneal injection of certain sulphones in dogs, Rosenfeld *et al.* (p. 187) showed that the drugs will cause haemolysis, the degree depending on the concentration of the drug in the blood. The degree of haemolysis may, in fact, be a good measure of concentration, for which good methods of estimation are not at present available.

Duarte and de Mello (p. 698) give a daily dose of 100–200 mgm. DDS by mouth in courses of 42 days followed by 15 days' rest. This they consider the treatment of choice.

Administration of sulphones by injection at intervals of a week or more is an advantage where patients are scattered, and has been much used by French workers. In the region of Fez, for instance, where the incidence is about 1·1 per 1,000, Halmagrand (p. 594) notes that the patients prefer ambulatory treatment with weekly injections of DDS. Where DDS is given by injection in 0·2 per cent. agar saline, the larger the crystals the more slowly is the drug absorbed; Floch and Gélard (p. 699) aim to give 1·5 gm. every 3 weeks, and they find a blood concentration of 0·1 mgm. per 100 cc. 21 days after an injection. Similarly, for convenience in an area of Africa where long distances must be covered by the treatment teams, Laviron *et al.* (pp. 698; 1256) give DDS by injection twice each month. The dose is 1·25 gm. suspended preferably in chaulmoogra ethyl esters (though groundnut oil may be used); it appears to be sufficient, providing adequate blood concentration for 15 days, and is not toxic for Africans.

Muraz (p. 807) writes of the incidence of leprosy in French Equatorial Africa, which in one place is over 10 per cent., and of the organization of village settlements and treatment centres proposed to cope with the problem. Treatment would involve injection of DDS in chaulmoogra esters twice each month. BCG would be used in prophylaxis.

Comparing two series of patients, Roy (p. 1069) concludes that a 20 per cent. suspension of DDS in hydnocarpus or coconut oil given by injection produces improvement more quickly and with less expenditure of drug than if the DDS is given by mouth.

Vedamuthu (p. 598) uses a 10 per cent. solution of Sulphetrone for subcutaneous injection along the course of thickened nerves, and a 5 per cent. solution for sub-conjunctival injection in leprous keratitis, corneal infiltration and iridocyclitis. Results 5 years after beginning of treatment with Cimédone (the French equivalent of Sulphetrone) indicate good response in lepromatous cases, but less good in tuberculoid. Laviron and Lauret (p. 1256) gave it by mouth, and although one inconvenience is that large amounts are necessary, the results are more appreciable than with DDS.

Early results of treatment of 43 patients with M2196 (diethyl-4-4′-diaminodiphenyl sulphone disulphonate of soda), given by injection thrice weekly in doses up to 800 mgm., indicate that it may be very useful. Touzin and Merland (p. 1168) state that it is very soluble and that intramuscular injection gives little or no pain; a constant blood level is not necessary for efficient results.

Dharmendra *et al.* (p. 942) have prepared a new sulphone which inhibits the Kedrowsky bacillus, and which they propose to try in human leprosy.

The experience of Melamed and Jonquieres (p. 278) suggests that sulphone treatment may activate pre-existing tuberculosis in leprosy patients, and they advise treatment with streptomycin, PAS and other anti-tuberculous drugs in such cases. Similar advice is given by Lima and Magarão (p. 278), who note that isoniazid has a good effect on the leprosy lesions also, especially those of the mucous membranes.

Lepromatous patients, improving on sulphone treatment, were given BCG by mouth each week; some improved but in many there were exacerbations and attacks of erythema nodosum, and Lippelt (p. 699) was not encouraged by the results.

Thiosemicarbazone

Reports on thiosemicarbazone have been favourable. Sagher and Brand (p. 276) found it as effective as DDS, a view shared by Roy (p. 598) (who finds it particularly useful in patients who cannot tolerate DDS) and Laviron *et al.* (p. 806) who, however, state that the bacteriological improvement is less marked than the clinical improvement. Certain other derivatives were less successful. These authors (p. 805) suspend 60 gm. of thiosemicarbazone in 460 cc. of neutral chaulmoogra oil and chaulmoogra ethyl esters with 4 per cent. of guaiacol. Of this, 5 cc. contain 600 mgm. of the drug, and this dose is given by injection once each week, with good results. Herrera (p. 1069) used Conteben (thiosemicarbazone) with some success in daily doses of 12·5 to 250 mgm. (average) or even 400 mgm. (maximum). The number of patients was small and the period of treatment short (12 months), and further trials are needed to assess its importance.

Morris (p. 1069) gave thiacetazone (12·5 mgm. daily, rising to 150 mgm., on 6 days each week) with encouraging results. To counteract the fall in haemoglobin, ferrous sulphate, 6 grains, was also given.

Isoniazid

Opinions are divided on the value of isoniazid, but on the whole are unfavourable though Sharp (p. 700) in East Africa, judging on clinical grounds (without mention of bacteriological examination) puts the results obtained in a 5-month trial on a level with those obtained with DDS and thiosemicarbazone. Secret (p. 598) also observed clinical improvement after 15 months of treatment of various forms, and Latapi *et al.* (p. 277) found it useful in some lepromatous cases—moderate lepra reactions occurred in about half of them. Lippi and Tucci (p. 187) also write favourably of it in nerve and mixed leprosy; there is a sense of well-being and a good effect on the bacillary content of nasal mucus. Some improvement was observed by Markianos (p. 700) who suggests that it might be used when the sulphones are not tolerated.

Davidson (p. 1070) reports that in a small series of patients rather more progress was made on isoniazid alone than on isoniazid with Sulphetrone, though isoniazid with thiacetazone was better than isoniazid alone in a few patients resistant to Sulphetrone.

On the other hand, adverse reports indicate that any improvement tends to be ephemeral. Dharmendra and Chatterjee (p. 942) found it useful in lepromatous leprosy in the first 3 months—bacteriological improvement was more marked than with sulphones and thiosemicarbazone—but there was usually a setback later. Iglesia *et al.* (p. 1070) found that the only result was some clinical improvement in the first few months.

Experience with patients in England confirms other reports that isoniazid

is not effective in lepromatous leprosy; Jopling and Ridley (p. 699) report some degree of lepra reaction in all the patients treated, but no evidence of improvement.

Floch and Sureau (p. 599) and Gussenhoven (p. 1257) have not found isoniazid of real value, and Chaussinand *et al.* (p. 806) have come to the conclusion that it is better tolerated but less effective than the sulphones, and that it cannot be recommended by itself, but may be used with profit along with the sulphones. Laviron and Lauret (p. 806) remark that the only patients who improved under treatment with isoniazid were those receiving small amounts of DDS also. Floch (pp. 806, 807) comments that isoniazid is of little use in leprosy, but writes favourably of the sodium salt of isonicotyl hydrazone of metasulphobenzaldehyde (G.605) when used in association with sulphones.

Other Treatments

Encouraging results with streptomycin, with or without other drugs, are reported in lepromatous and tuberculoid leprosy by Garduño (p. 277), who suggests further study.

The lepra reaction may be treated in various ways. Contreras *et al.* (p. 942) have used transfusions of blood to overcome the hypoproteinaemia [not hyperproteinaemia as in the abstract—see also this *Bulletin*, 1953, v. 50, 424] which is a feature of the condition; the results were very good. Iglesia (p. 1068) successfully used cortisone in daily doses of 200 mgm. by mouth, gradually diminishing to 100 or 75 mgm. He stresses the importance of early administration. Pennek (p. 805) used pregnenolone, a cortisone-like substance, with some success, and this has also been used by Floch and Sureau (p. 392) for leprous iridocyclitis, and is preferred to cortisone and corticotrophin. Merklen and Riou (p. 392) found vitamin K useful in the lepra reaction, but Floch and Sureau (p. 392) think that it has no effect on the disease itself, and that its action is subjective.

Chaussinand *et al.* (p. 807) used ultra-sonic waves for the treatment of ulnar deformity in leprosy, with some success. Electrotherapy in various forms has been found valuable by Barnay (p. 392) in the treatment of perforating ulcers and irreducible deformities of the hand.

A series of papers have been published by Brand (p. 599) and Thomas (p. 599) on physical medicine and orthopaedic surgery in leprosy. These are important papers and they contain much detail which should be read in full. There is, of course, stress on the importance of restoration of function, and rehabilitation.

Control

Accounts of control measures are given by Contreras (p. 943) for Spain and by Zaccaria (p. 1167) for Tripolitania, where compulsory isolation was introduced in 1937; in comment Cauchi remarks that it is apt to defeat its object. Similarly, Picarelli (p. 700) argues against the present Brazilian system of compulsory segregation, and suggests isolation on a domiciliary basis, with efficient inspection.

Risi *et al.* (p. 596) express dissatisfaction with the results being achieved in Brazil, and stress the importance of house infection, quoting an incidence rate of 39·8 per 1,000 in house contacts, against 2·8 in non-contacts.

An account of the type of leprosy seen in patients of the Cuban sanatorium San Luis de Jagua, where 80 per cent. have lepromatous disease, is given by González Prendes *et al.* (p. 1067). Marriages are encouraged among the patients, and children of such marriages are removed at birth and lodged with relatives outside.

The incidence of leprosy in part of Northern Rhodesia is about 1 per cent. and Worsfold (p. 493) reports that control is attempted through a central settlement for 350 lepromatous or deformed patients, or able-bodied patients with good prognosis, who do most of the work. In addition there are self-supporting leprosy villages, which are popular. Long-term sulphone treatment can be given in such villages, and the scheme is a success.

In one of the last papers published before his death Lowe (p. 1252) discussed the possibility that there may be some cross-immunity between leprosy and tuberculosis which could account for the decline in leprosy in Europe. Leprosy does not propagate itself easily, whereas tuberculosis tends to do so, and there is evidence that infection with the tubercle bacillus or BCG sensitizes to lepromin. It seems likely that tuberculosis tends to drive out leprosy. He had little faith in isolation as a control measure, but modern treatment by reducing infectivity may bring the disease slowly under control. BCG will probably be useful for contacts, especially children.

The fact that BCG sensitizes to lepromin is recorded by several workers. Rosemberg *et al.* (p. 938) gave it by mouth, and found that it converted lepromin-negative patients to the lepromin-positive state, and increased the degree of lepromin positivity in patients already positive. In patients with frequent lepra reactions, BCG by mouth tends to reduce the frequency and severity.

Children removed from leprosy foci at birth were found negative to lepromin 4–36 months later; after oral BCG all gave a positive lepromin test (Salomão and Ferreira, p. 939). Budiansky and de Campos (p. 940) show that BCG given by mouth produced a positive lepromin reaction in 9 of 9 children in contact with leprosy and in 21 of 29 not in contact. They suggest that this action may be due to a fraction which also exists in leprosy bacilli.

Floch (p. 940) shows that BCG given by intradermal injection gives rise to positive lepromin reactions more often than BCG given by scarification, but for immunization of infants he advocates the simplest method, which is scarification.

de Souza Campos (p. 494) discusses the rationale of BCG vaccination in the prophylaxis of leprosy, and quotes a preliminary observation on work in Brazil in which BCG was given on 3 occasions by mouth to 1,658 contacts of lepromatous patients. After a period of months the incidence of leprosy in this group was much lower, and the few cases were much milder, than in a comparable control group. This early finding, if confirmed later, may be revolutionary [a view which is shared by Lowe and McNulty (p. 278)].

Vaccination of lepromatous patients against smallpox may lead to the lepra reaction, but Melamed and Fiol (p. 275) state that there is no risk with tuberculoid or indeterminate forms.

A survey of recent legislation in leprosy has been published in the *International Digest of Health Legislation* (p. 494). It deserves careful study.

Rat Leprosy

Experiments with mice infected with *Myco. leprae murium*, evaluated by a system of counting bacilli in smears from the spleens, indicate that isoniazid and a chemical combination of isoniazid and streptomycin are useful drugs. Hobby *et al.* (p. 808) show that streptomycin, viomycin and Promin are also useful, in that order of effectiveness.

Isoniazid has been used in rat leprosy by several workers. Chaussinand *et al.* (p. 67) found that it tended to delay and restrict the lesions and the spread of the disease, especially if the beginning of treatment was postponed

for some 17 days after infection. On the other hand, after prolonged observation of rats treated with isoniazid, CRUICKSHANK (p. 1259) found that although survival time was extended, all the animals eventually died of the disease. This supports the opinion that isoniazid should not be used alone in human leprosy. BUSHBY and BARNETT (p. 944) also report that the beneficial action of isoniazid in rat leprosy is only temporary, and that the animals eventually die with very heavy infections. They attribute this to development of resistance, and they think that the human leprosy bacillus also develops resistance quite rapidly. Isoniazid should be used only with other drugs.

Isoniazid was of little value in rats infected intranasally with *Myco. leprae murium*, but was useful in others infected subcutaneously (MUDROW-REICHENOW, p. 1168).

In an experiment in which BCG was given to guineapigs into which rat leprosy bacilli were later injected, NEYRA-RAMIREZ (p. 495) found that the effect of the BCG was to hasten the process of phagocytosis, compared with controls.

Some reduction in the degree and extent of infection of rats with *Myco. leprae murium* was effected by previous vaccination with BCG, compared with controls, and AZULAY (p. 1258) regards this as confirmation of its value in man. *Charles Wilcocks*

MALARIA

In this section abstracts are arranged as far as possible in the following order:—Human malaria—*epidemiology, aetiology, transmission, pathology, diagnosis, clinical findings, treatment, control;* Animal malaria—*monkeys, other animals, birds.*

CAMBOURNAC, F. J. C., GÂNDARA, A. F., PENA, A. J. & TEIXEIRA, W. L. G. Subsídos para o inquérito malariológico em Angola. [**An Investigation of Malaria in Angola**] *Anais Inst. Med. Trop.* Lisbon. 1955, Mar.–June, v. 12, Nos. 1/2, 121–53, 10 graphs & 11 maps. English summary.

It is well known that malaria is widespread in Angola, and the authors quote a few of the most important references to it. They undertook a malaria survey during their investigation of the incidence of yellow fever protective antibodies [below, p. 1073], and in this they examined thick and thin blood smears (on the same slide) and noted the spleen rates and sizes in the communities examined. In 87 different areas in all provinces they examined 5,766 African children.

Spleen rates varied very greatly in each province, from 2·7–25·0 per cent. for the lowest rates to 62·5–94·2 per cent. for the highest. Parasite rates varied from 0–10 per cent. for the lowest rates to 50–82·5 per cent. for the highest. *Plasmodium falciparum* was by far the most common parasite, but *P. vivax* and *P. malariae* were both found.

The results are given in great detail in a series of tables, which show spleen rates, spleen sizes, and parasite rates, and in maps. They are not classified according to age. *Charles Wilcocks*

CHANG, Wen-pin & WU, Chün-chung. [**Epidemiology of Malaria in Taiwan**] *J. Formosan Med. Ass.* 1955, Feb., v. 54, No. 2, 66–74, 7 charts. [24 refs.] [In Chinese.] English summary.

Malaria is prevalent in Taiwan [Formosa] and is one of the principal causes of death there.

The authors summarize the epidemiology of the disease between 1906 and 1942 as follows:—

The malaria mortality of Formosans per 10,000 reached its peak (39·3) in 1915 and was lowest (5·8) in 1941. Over the whole 37 years, it was highest between 1906 and 1915, but fluctuated greatly. There was a clear downward trend from 1915 to 1930 and thereafter only minor fluctuations, until the death rate increased under war conditions from 1942.

Statistical analysis showed a clear downward trend. The annual change is expected to be an increase or decrease of 0·886 per 10,000, based on the 1924 population.

There is a seasonal peak in November and a low point in April. Death rates are usually highest between July and December. The death rates are highest in eastern districts, next highest in certain southern and central areas and low in northern parts. The Pescadores show great fluctuation, but have the lowest death rate (except during a few years).

Death rates are highest in rural areas, where the disease is most prevalent. The highest death rates were in the 0–9-year age-group, especially in those under 4 years: this group accounted for about one-third of all deaths from malaria.

After 14 years and up to 54 years deaths are much higher in males than in females. *H. J. O'D. Burke-Gaffney*

Hsieh, H. C., Chuang, C. H., Tseng, P. T. & Chen, W. I. **Some Epidemiological Observations of Malaria in Shih-Tzu District of Southern Taiwan.** *J. Formosan Med. Ass.* 1954, Sept., v. 53, No. 9, 553–9.

Shih-Tzu district is a thickly wooded, hilly region, 154 square kilometres in area with abundant small streams which are torrents in the rainy season and leave small pools in rocky river beds in the dry season; these are adequate breeding places for anopheline mosquitoes. The people belong to the Paiwan tribe which is predominantly aboriginal. Spleen and parasite rates exceeded 80 and 30 per cent. respectively; moreover, the spleen rate exceeded 80 per cent. in all age-groups with the exception of the group 1–2 years, in which it was 48 per cent. Six species of anophelines were found, *Anopheles hyrcanus sinensis*, *A. minimus*, *A. maculatus*, *A. annularis*, *A. tessellatus* and *A. ludlowi*; of these *A. maculatus* predominated, but *A. minimus* was almost the only species collected from houses during the day time. *R. Ford Tredre*

Demos, E. A., Chen, H. H. & Hsieh, H. C. **Malaria and Filariasis Investigation in Pescadores (Peng-Hu) Islands of Taiwan, Republic of China.** *J. Formosan Med. Ass.* 1954, Sept., v. 53, No. 9, 541–52, 7 figs. on 2 pls. [12 refs.]

The Pescadores Islands are an administrative area of Taiwan, are 64 in number and have a land area of approximately 127 square kilometres. They are situated west of Taiwan and to the south-east of continental China; latitude is 23° north. Most of the islands are waterless and uninhabited. The economic status of the people living in 21 of these islands is low, their main occupation being dry-crop farming and fishing. Water obtained from wells is stored by the individual householder in a series of ceramic pots let into cement. Mosquitoes were found breeding in these storage reservoirs. Investigation by a team of workers showed that owing to the geographical and climatic conditions the islands are practically free of anopheline breeding

and so free of malaria transmission, but during certain of the summer months, coinciding with the rainfall, some streams or water collections may become breeding places of *Anopheles hyrcanus sinensis* and malaria may be introduced from the mainland. Spleen rates in schoolchildren range from 1·15 to 15·22 per cent.

Filariasis due to *Wuchereria bancrofti* is common, hydrocele rates of 2·2 and 16 per cent. were found in schoolboys and inmates of a relief centre respectively. In one village with a population of 1,000 people the infection rate of microfilariae was 17·7 per cent., there being little difference between the sexes. In the course of the investigation, lymphadenitis, elephantiasis and other external manifestations of filariasis were seen. *Culex fatigans* was the commonest mosquito found and was believed to be the vector of filariasis.

R. Ford Tredre

Bishop, Ann. **Problems concerned with Gametogenesis in Haemosporidiidea, with particular reference to the Genus** *Plasmodium*. *Parasitology*. 1955, May, v. 45, Nos. 1/2, 163–85. [Numerous refs.]

The author gives a critical review of the state of our knowledge regarding the development and factors affecting the production of gametocytes in *Plasmodium* and other Haemosporidia. After a short historical survey of the data concerning the development of *Plasmodium* gametocytes in mosquitoes, the course of gametogenesis and the problem of reduction division in this genus are considered. The evidence provided by *P. gallinaceum* indicates that gametocytes are produced directly from exo-erythrocytic schizonts, but the available data—which are discussed—have failed to solve the question about reduction division, so that we are still in ignorance as to whether the malaria parasites are haploid or diploid.

There is growing evidence of the effect of the physiological condition of the host upon the gametocytes produced in *Leucocytozoon*, *Haemoproteus* and avian *Plasmodium*, indicating that their numbers vary in different seasons and may be correlated with the reproductive activities of the birds. It was also thought that the number of gametocytes may differ if a strain of *Plasmodium* is maintained in different hosts, but the evidence is conflicting and inconclusive. The number of gametocytes in malaria parasites is also influenced by the method of transmission, thus in some species continued blood-transmission is usually followed by their diminution and even disappearance, whereas cyclical transmission through mosquitoes promotes gametocyte production in the strain. It was also thought that the formation of gametocytes in *Plasmodium* depended on the state of immunity of the host, but this assumption is not supported by the available evidence. In general, the gametocyte density of *Plasmodium* in the blood is correlated with their infectivity for mosquitoes and the number of oöcysts developing in them, but cases are known of failure to infect susceptible mosquitoes from hosts harbouring numerous gametocytes. Apparently not only numbers but also some unknown "quality" of the gametocytes is an important factor.

Finally, the effect of antimalarials upon gametocytes is discussed, and it is pointed out that whereas small doses of pamaquin and primaquine completely inhibit the development of gametocytes, proguanil does not prevent the formation of oöcysts but inhibits their further development.

The subject dealt with in this paper is of the greatest importance to malariologists, who should consult the original for details and references.

C. A. Hoare

Garnham, P. C. C., Bray, R. S., Cooper, W., Lainson, R., Awad, F. I. & Williamson, J. **The Pre-Erythrocytic Stage of** *Plasmodium ovale*. *Trans. Roy. Soc. Trop. Med. & Hyg.* 1955, Mar., v. 49, No. 2, 158–67, 10 figs. [9 (8 coloured) on 2 pls.] & 1 chart. [20 refs.]

A detailed account is given of the pre-erythrocytic development of *Plasmodium ovale*, the study of which—like that of *P. vivax* and *P. falciparum*—was based on experimental infections in human volunteers with a Liberian strain, in this case the authors themselves [this *Bulletin*, 1954, v. 51, 668]. These experiments also provided the first opportunity to study the clinical course of the infection in normal persons, whereas our previous knowledge was derived from induced infections in neurosyphilitics. It is usually assumed that *ovale* malaria runs a very mild course, but the authors found that the paroxysms of fever were accompanied by shivering and rigors, and there was severe and persistent headache. Fever was irregular or with a tertian periodicity, in some cases rising to 105°F. [*ca.* 40·6°C.], and persisting for 3 weeks, with a palpable spleen. Moreover, in sporozoite-induced infections there were relapses after the primary attack had been checked with chloroquine.

The blood infection was typical for this species, but it was noted that about 50 per cent. of the host cells harbouring young trophozoites were reticulocytes, which mature as the parasites develop. *P. ovale* was found to differ from all other mammalian malaria parasites in the large size of the nuclei and merozoites (up to 3μ). In fresh blood oval and fimbriated host cells were not common, and these changes are regarded as artefacts produced by dry fixation of the blood films. Another characteristic feature of *P. ovale* was the production of double the usual number of merozoites (12–16) by the schizonts during relapses. The development of this parasite in *Anopheles maculipennis* took 14 days at 26°C., with from 1 to 50 oöcysts measuring 50μ in diameter.

One of the authors was infected by the bites of 750 mosquitoes which had previously fed on another infected volunteer. The mosquitoes were allowed to bite on 3 separate occasions, when 550, 120 and 310 respectively fed. Biopsy of the liver was performed 9 days after the first exposure to mosquito bites, when a piece weighing about 10 gm. was removed and fixed in Carnoy's fluid. The total number of schizonts found in 4000 sections was 17, representing 5th and 9th-day stages of development, which are described in detail and illustrated by superb coloured figures. The 5th-day schizonts measured from 28 μ to 60 μ, and were oval or convoluted in shape, with very large nuclei (2 μ). As the schizont grows it becomes lobulated, measuring on the 9th day about 70–80 μ × 50 μ, with nuclei half the size of the younger forms. In the final stage of development the schizonts undergo segmentation, giving rise to over 15,000 merozoites, which have a characteristic structure: they are large (1·8 μ), spherical bodies with the nucleus at one pole. Since merozoites appeared in this material, the length of the pre-erythrocytic cycle in *P. ovale* is 9 days.

In discussing the results of this investigation, the authors note that the characters of the tissue phase of *P. ovale* differ markedly from those of *P. vivax* and *P. inui*, but show a superficial resemblance to those of *P. falciparum* in size and form. However, they differ from the latter considerably in other features: whereas in schizonts of the same dimensions *P. falciparum* produces 40,000 small merozoites (0·7 μ), *P. ovale* produces 15,000 large merozoites (1·8 μ). It is pointed out that the occurrence of relapses, which appeared up to 103 days after the primary attack, is suggestive of the persistence of exo-erythrocytic schizogony in *P. ovale* after invasion of the blood.

[There is a growing tendency in papers dealing with the life-cycle of *Plasmodium* to use the term exo-erythrocytic in two different senses: (1) to denote the tissue phase as a whole, and (2) to indicate the continued development of the parasite in the tissues following the termination of the pre-erythrocytic cycle and the establishment of the erythrocytic cycle. This practice is both illogical and misleading, but the ambiguity could be avoided if the term exo-erythrocytic were applied only to the tissue phase *in general*, dividing it further into (1) pre-erythrocytic and (2) para-erythrocytic cycles.] *C. A. Hoare*

Davidson, G. **Measurement of the Ampulla of the Oviduct as a means of determining the Natural Daily Mortality of** *Anopheles gambiae*. *Ann. Trop. Med. & Parasit.* 1955, Mar., v. 49, No. 1, 24–36, 1 graph. [21 refs.]

See this *Bulletin*, 1955, v. 52, 121.

Macdonald, G. **The Measurement of Malaria Transmission.** *Proc. Roy. Soc. Med.* 1955, Apr., v. 48, No. 4, 295–302 (Sect. Epidem. & Preventive Med. 11–18), 1 fig. [21 refs.]

Two malaria surveys by Davidson and Draper [this *Bulletin*, 1954, v. 51, 456] and Davidson (*Trans. Roy. Soc. Trop. Med. & Hyg.*, 1955, v. 49, 339) in Tanganyika and Uganda provided the data for this paper. The vectors in this region are *Anopheles gambiae* and *A. funestus*.

From a study of the population density of the mosquitoes, their biting frequency and infection rates, it was calculated that in Tanganyika, on an average, each person is bitten by about one infective mosquito daily whereas in Uganda the rate is only one infective bite every 3 days. From the mortality rates of the vector mosquitoes in nature and the incubation period of the malaria parasites inside the mosquito, it is possible to derive figures which will indicate the expectation of life of an infective mosquito. Expressed as the number of bites which a mosquito which had once fed on an infected person might later inflict on man while harbouring mature and possibly infective parasites, this means that in Tanganyika an infective *A. gambiae* may be expected to bite man 2·7 times before it dies while in Uganda the expected number of bites by an infective *A. gambiae* would be as high as 10·7.

From the probability of survival of the vector mosquitoes throughout one day, the incubation period of the parasite inside the mosquito and the proportion of mosquitoes with sporozoites in their salivary glands, the basic reproduction rate of malaria (defined as the number of infections distributed in a community when there is no previously infected person or mosquito in the community) can be calculated. The critical value of this rate is 1·0, values below which result in the progressive elimination of the disease. It is shown that although the values for the component parts from which the basic rates are computed actually differ in the two vector species in Tanganyika and Uganda, the basic rates themselves are very similar, *i.e.*, 1·15 for Tanganyika and 1·25 for Uganda. It would also appear that in many of the hyperendemic parts of Africa, the potentially high basic reproduction rate of the disease (as suggested by the number of infective bites per person per day) is automatically adjusted by some governing mechanism so that it lies just above its critical level of 1·0. Among the factors which thus keep down the basic reproduction rate, reduced infectivity of the mosquito seems to be the most important. From a curve showing the infant parasite rates

from birth onwards in the Uganda survey, it can be seen that an infective mosquito is able to implant the infection successfully only every 67 days. This of course is different from the figure of one infective bite every 3 days calculated from the mosquito density and infection rates. If infectivity is taken as a function of the density of infection in the mosquito, then it would appear that reduced infectivity of the mosquito could be traced through intermediate stages to a reduced infectivity of the human case, this in turn being due to a reduction in the gametocyte density, produced as a result of immunity.

It has already been remarked that there are adjusting factors which keep transmission (and the basic reproduction rate of the disease) to just over the critical value. This balance can however be upset by an interruption of transmission which results in the growth of a non-immune group of infants or by the influx of large numbers of non-immunes into that particular community.

The above conclusions have a bearing on practical problems such as control; elimination of the disease is possible only by control which will reduce and keep the reproduction rate of the disease to below its critical value.

In conclusion the author states that although conditions seem to favour a high rate of malaria transmission in Tanganyika and Uganda, in actual fact this is not so. The development of immunity and the consequent reduction of the gametocyte rate keeps the reproduction rate of the disease to just above its critical level below which its complete elimination would follow. Although rapid changes in mosquito density and other factors can upset the reproduction rate, such changes in the areas under consideration do not upset the endemic level (*i.e.* the proportion of infected people in the population). This insensitivity of the endemic level is a predominant characteristic of malaria in Tanganyika and Uganda. This is in contrast to the highly sensitive and frequently epidemic malaria in the plains of India.

The paper is followed by an appendix explaining the mathematical formulae used in the text, and comments on the paper by Mr. P. G. Shute.

M. G. R. Varma

Lambrecht, F. L. Notes sur l'anophélisme dans la vallée de la Ruzizi (Kivu—Congo Belge) et des essais de DDT-isation. [**Anophelism in the Ruzizi Valley, Kivu, Belgian Congo. Trials with Space Sprays**] *Ann. Soc. Belge de Méd. Trop.* 1954, Dec. 31, v. 34, No. 6, 931–61, 2 pls. [14 refs.]

Catches in exit-traps and by space-spray in houses in the Ruzizi valley, north of Lake Tanganyika, are reported. *A. funestus*, *A. pharoensis* and *A. gambiae* occurred and percentages of each sex, gravid, fed and unfed females are tabulated. Larval surveys yielded also *A. coustani*, *A. pretoriensis*, *A. marshalli* and *A. longipalpis*, besides unnamed culicines. Salivary gland infections in *A. gambiae* were in this series of catches from June to October, only 1 positive in 497 specimens examined. But, in February, 9·23 per cent. of 130 *A. gambiae* in the village of Kasenga, near Uvira, had sporozoites in their glands. Most of the gorged specimens of the 3 species taken in houses were, on test, positive for human blood. Some general comments are given on breeding and biting habits of *A. pretoriensis*.

D. S. Bertram

See also p. 1148, Adam, Quelques anophèles nouveaux pour la fauna camerounaise. [**Some Anophelines newly recorded in the French Cameroons**]

See also p. 1148, Hamon *et al.*, Contribution à l'étude des Culicidés de l'Ouest du Sénégal. [**Observations on Mosquitoes of West Senegal**]

Atchley, F. O., Traylor, W. R. & Weathersbee, A. A. **Effects of Variations in Reservoir Levels, Rainfall, and Temperature on Anopheline Densities in a Coastal Plains Area in South Carolina.** *J. Parasitology.* 1955, June, v. 41, No. 3, 273–80, 5 figs.

The abundance of adults of *Anopheles quadrimaculatus* and *A. crucians* was studied during 1947–51 in relation to rainfall, air temperatures and water level of the Santee Reservoir in east-central South Carolina. The results reported, of densities by day in occupied mule stables, are for March to November when mosquito numbers were appreciable. The results are illustrated by simple graphs for each year of fluctuations in the several factors studied and in mosquito densities. Minimum temperatures below 40°F. controlled the appearance of adult mosquitoes in spring and their disappearance in autumn. Overwintering larvae of *A. crucians* were responsible for earlier adults of this species than of *A. quadrimaculatus*. Owing to the flat shore line of the reservoir, numbers of *A. quadrimaculatus* were less affected by rises and falls of reservoir level than in similar impounded waters with steep banks elsewhere (Tennessee Valley). *A. crucians*, breeding in woodland ponds, was more numerous when rainfall or the reservoir level was high, both causing numerous pools to form in the vicinity of the impounded waters. No relationship of mosquito densities to maximum temperatures (about 100°F.) was apparent. *D. S. Bertram*

See also p. 1149, DeCoursey *et al.*, **Studies on the Effect of Insecticides on the Oviposition of** *Anopheles quadrimaculatus* **Say.**

Wallis, R. C. **A Study of the Oviposition Activity of Three Species of** *Anopheles* **in the Laboratory.** *Amer. J. Trop. Med. & Hyg.* 1955, May, v. 4, No. 3, 557–63. [13 refs.]

This is an interesting paper which goes far to explaining some of the conflicting results which have been obtained in laboratory experiments by various authors to test the selection of different concentrations of salt solutions (sodium chloride) by ovipositing anopheline mosquitoes. It is shown, by the simple device of providing a glass platform covering about an eighth of the area of a Petri dish of solution, that the tendency of particular mosquito species to oviposit while in flight is an important factor in the dispersal of eggs over an area beyond that selected by the flying female. In experiments in which a number of solutions (distilled water and graded sodium chloride concentrations) are offered in adjacent Petri dishes in a cage about 2 ft. cube, there can be sufficient dispersal of eggs over several of the dishes beyond the intended site of oviposition to give an apparent result of no or little discrimination in the choice of solution. The error is affected by the proportion of eggs laid while in flight and whether the mosquito flies to and fro over a limited area above the solution of choice or ranges more widely over it. Thus, *A. quadrimaculatus* deposited 88 per cent. of its eggs while in flight but, flying within narrow limits, dispersed only 8 per cent. into dishes adjacent to the choice solution (distilled water). Increasing the distance from 5 to 10 cm. between dishes greatly increased the concentration of eggs in the preferred distilled water. *A. freeborni* and *A. aztecus* laid, respectively, 8 per cent. and 1 per cent. of eggs when on the wing and 24 per cent. and 12 per cent. of these overlapped to dishes adjacent to the

preferred one. Both these species fly more widely around the dish of choice. With them, consequently, small differences in distance between dishes give less correction of error due to accidental deposit of falling eggs in other than the preferred dish. *D. S. Bertram*

Bignami, A. Studi sull'anatomia patologica della infezione malarica cronica. [**Studies on the Pathological Anatomy of Chronic Malaria**] *Riv. di Malariologia*. 1954, Dec., v. 33, Nos. 4/6, 185–245. [Refs. in footnotes.]

This is the first of a series of publications by the *Rivista* of early papers on malaria which are now rarely available. It is a lengthy treatise originally published in Rome in 1893 by the late Professor Amico Bignami (1862–1929) and based on 27 cases of chronic malaria studied by him about that time.
H. J. O'D. Burke-Gaffney

See also p. 1136, Deliyannis & Tavlarakis, **Compatibility of Sickling with Malaria.**

Covell, G. *et al.*, **Chemotherapy of Malaria.**

This book is reviewed on p. 1157.

Carrescia, P. M. & Masdea, E. La malarioterapia nei neurolueticì. (Rendiconto clinico-statistico sull'attività svolta dall'Istituto di Malariologia " E. Marchiafava " negli anni 1936–1954.) [**The Malaria Treatment of Neurosyphilis. (A Clinical Statistical Report on the Work of the Malaria Institute " E. Marchiafava " in the Years 1936–54)**] *Riv. di Malariologia*. 1954, Dec., v. 33, Nos. 4/6, 247–60. [15 refs.] English summary.

The authors have studied the records of 506 patients who were treated at this Rome Institute during the 19-year period from 1936 to 1954. The cases are classified clinically into progressive paralysis, locomotor ataxia, taboparalysis, neurosyphilis [no attempt is made to define these terms] and congenital syphilis. The incidence of these conditions is studied by age and sex and the authors analyse the intervals between the time of the original infection and the onset of the complication in the nervous system for this particular series.

The authors deal with these records at somewhat greater length *qua* malaria, and have analysed the behaviour of the artificially induced infection. The bites of infected mosquitoes were used for the inoculation of 50 of the patients and these cases showed a real incubation period due to the exo-erythrocytic stage of development of the parasite. Each of the other 456 patients was injected intravenously with 7–8 cc. of citrated, infected, blood which was shown to retain its infectivity after keeping for as long as 24–48 hours: in these cases an interval must elapse before the malaria parasites have multiplied sufficiently, within the blood cells, to be demonstrable in blood specimens by ordinary laboratory methods. [In their various tables, however, the authors use the term " incubation period " for both series of cases.] A total of 386 patients were infected with *Plasmodium vivax* and 23 of these had had a previous malaria infection, either natural or therapeutic; for *P. malariae* the corresponding figures were 66 and 15 and

for *P. falciparum* 53 and 24. The various data are analysed and tabulated under such headings as "incubation" periods, day of highest parasite invasion of the blood, incidence of initial fever, average number and frequency of malaria paroxysms and rate of spontaneous recovery. Specific treatment was with quinine in 278 cases, chloroquine in 87, mepacrine in 28 and proguanil in 12. The results of this treatment are summarized as the number of days taken for the fever and for the parasites to disappear for each species of *Plasmodium* and for each drug.

[The many data given do not lend themselves to abstracting, even partly, in this summary, and the paper must be consulted for further figures, which include some slight inaccuracies.] *J. Cauchi*

Fischer, O. Atebrinfieber. [**Atebrin (Mepacrine) Fever**] *Ztschr. f. Tropenmed. u. Parasit.* Stuttgart. 1955, June, v. 6, No. 2, 176–80, 4 charts.

The English summary appended to the paper is as follows:—

"A male patient, 51 years, who was treated for a relapse of malaria proved hypersensitive against atabrine. Oral doses caused rises of temperature, intramuscular injections were followed by vomiting, fits and unconsciousness, even a skin test with a minimal amount of atabrine produced an access of fever. The cell count showed a slight increase of leucocytes and eosinophiles."

Laing, A. B. G. **The Single Dose Treatment of Falciparum Malaria with Nivaquine. A Review of 164 Cases treated at the District Hospital, Kuala Kangsar.** *Med. J. Malaya.* 1955, Mar., v. 9, No. 3, 216–21.

One hundred and sixty-four patients suffering from *P. falciparum* malaria were treated with a single dose of Nivaquine (chloroquine sulphate), 97 by the oral, 54 by the intramuscular and 13 by the intravenous route. The dosage employed for adults, by the oral route, was 0·6 gm. chloroquine base, by the intramuscular route 0·3 gm. chloroquine base and by the intravenous route 0·4 gm. chloroquine base. [It appears from the context that all the patients were indigenous inhabitants of Malaya, though this is not actually stated.]

In the great majority of cases in all groups asexual parasitaemia disappeared within 48 hours and pyrexia within 36 hours. Parenteral administration reduced fever rather more rapidly than oral. Eight patients experienced a slight transitory disturbance of vision, only one of these being in the oral group. Intravenous administration caused a transient fall of blood pressure, the systolic falling on an average by 16 mm. Hg and the diatolic by 4 mm. Hg. No other evidence of toxicity was observed and intramuscular injection gave rise to no adverse local effects.

It is concluded that the powerful schizonticidal action of the 4-aminoquinolines has made possible an easy, cheap and effective method of treating malaria without recourse to hospitalization. *G. Covell*

Fabre, J. & Joigny, J. R. Un an de chimioprophylaxie par la flavoquine effectuée à Pointe-Noire (Moyen-Congo). [**A Year's Chemoprophylaxis with Flavoquine (Amodiaquine) at Pointe Noire, Middle Congo**] *Bull. Soc. Path. Exot.* 1955, v. 48, No. 1, 99–111, 2 charts & 2 graphs.

The subjects of the investigations here reported were African children living in the neighbourhood of Pointe Noire, a coastal town in the south-western corner of French Equatorial Africa.

Flavoquine (amodiaquine) was administered to 318 children at fortnightly intervals in the following dosage: below 1 year—0·1 gm. (half a tablet); 1 to 5 years—0·2 gm. (one tablet); 6 to 12 years—0·4 gm. (2 tablets). Two hundred children who received no antimalarial drug were examined at intervals for comparison purposes.

At the end of 6 months the spleen index in the treated group had fallen from 16·6 to 9·3 per cent., and the parasite index from 30·8 to 6·0 per cent. In the untreated group the spleen index rose from 37·5 to 38·4 per cent. and the parasite index from 44·5 to 50·5 per cent. during the same period. None of the children treated showed any evidence of toxicity.

After 24 doses had been administered at fortnightly intervals there was a marked decrease in the splenic index, a spectacular decrease in parasite index and a striking improvement in the general health of the children treated. It was concluded that Flavoquine is a valuable drug for collective prophylaxis of malaria.

The results are shown in great detail in tables and charts. *G. Covell*

de Mello, J. P. & de Mello, R. N. **Camoquin as a Malaria Suppressant.** *J. Trop. Med. & Hyg.* 1955, July, v. 58, No. 7, 162–3, 1 fig.

On a farm 7½ miles from Nairobi, the authors had very satisfactory results in the treatment of subtertian malaria in Africans with camoquin [amodiaquine]. Most of the Africans, who were members of the Kikuyu tribe, came from endemic areas. Malaria morbidity is at its peak in June and July after the rains, and fresh infections occur at that time.

In 1953, malaria mortality was high, especially in children between 6 months and 2 years. In March 1954, camoquin was given as a suppressant for 5 months to 23 children aged 5 months to 8 years out of the 31 children on the farm. Dosage was 0·1–0·2 gm. according to age and treatment was given weekly: the drug was given in small pieces between sliced bananas and was taken readily in this form.

During the 5-month period, none of the treated children suffered from malaria or showed parasites at monthly blood examination, though various other diseases occurred. Three of the 8 untreated children developed malaria. *H. J. O'D. Burke-Gaffney*

Ministère de la Santé Publique. Paris. Contribution à l'étude de l'anophélisme et du paludisme en Corse [Toumanoff, C.]. [**Study of Anophelines and Malaria in Corsica**] *Monographie de l'Institut National d'Hygiène No. 4.* 112 pp., 5 maps (3 coloured) & 8 figs. [30 refs.] 1954. Paris (16e): Inst. Nat. Hyg., 3, rue Léon-Bonnat.

This detailed report compares anopheline numbers and malarial incidence in Corsica in 1953 and early in 1947, before DDT treatments. Except for some parts of the island where control was not agreed to by the people, or other reasons prevented treatment, anopheline adults were not to be found indoors in 1953. Antilarval work was coupled with indoor spraying since it was reasoned that sufficient outdoor resting occurred with *A. m. labranchiae* and *A. m. sacharovi*, and particularly *A. claviger*, to make indoor spraying alone ineffective as an adequate control. All 3 species are considered to be vectors in Corsica; there is considerable discussion about the justification of this claim for *A. claviger*. There is an indication that some anopheline species are breeding more prolifically in untreated mountain regions than they did formerly before breeding sites in the plains were subject to antilarval treatment. Future work calls for further study of these problems.

In treated areas, malaria control has had excellent results and these parts must be protected in future by extending control. *D. S. Bertram*

Livadas, G. **Resistance of Anophelines to Chlorinated Insecticides in Greece.** *Mosquito News.* 1955, June, v. 15, No. 2, 67–71, 5 figs. [10 refs.]

In a previous paper [this *Bulletin*, 1953, v. 50, 1007] the author with Georgopoulos reported field observations suggesting that *A. sacharovi* in Greece was becoming resistant to DDT. In this paper he gives further observations on the effects of various insecticides on this mosquito, in the field and in laboratory tests. The anopheline density in houses sprayed with DDT (2 gm./m²) in the Scala-Laconia district showed little effect. Treatment by chlordane (at 1·5 gm./m²) caused a temporary decline for about 5 days, followed by return to normal. Spraying by dieldrin (0·4 gm./m²) or a mixture of dieldrin and Diazinon (0·25 plus 0·32 gm./m²) reduced the anopheline considerably for some time, though a rise was perceptible 2–3 weeks afterwards. The effects of these treatments could also be judged by mortalities of mosquitoes caught in the sprayed houses and kept in cages for 24 hours. The DDT gave kills of only 35 per cent. falling to 24 per cent. and chlordane gave even lower kills throughout. The dieldrin and, even more, the dieldrin-Diazinon mixture, gave very high kills for a week or two; but both fell off in effectiveness by the end of 2–3 weeks.

Laboratory tests were done by two methods to determine the level of resistance to DDT of *A. sacharovi* mosquitoes from different areas in 1953 and 1954. The 90 per cent. lethal doses (in microgrammes per mosquito) for mosquitoes from different villages were as follows:— Agoulinitsa (1954) 0·19; Elos (1953) 0·36, (1954) 0·48; Asterion (1954) 0·48. Similar tests on *A. maculipennis* from Georgiopolis in Crete gave an LD 90 of 0·14.

Tests by exposure to standard residues on filter paper gave 50 per cent. LD of 1·4 per cent. DDT for Agoulinitsa (1954) and 2·75 per cent. for Asterion (1954). These figures show great variability in susceptibility to DDT in different regions. The data for Elos suggest an increase in resistance between 1953 and 1954. *J. R. Busvine*

Pringle, G. **The National Campaign against Malaria in Iraq: Progress Report, 1946–1952, I.** *Bull. Endem. Dis.* Baghdad. 1955, Jan., v. 1, No. 2, 87–117, 2 folding coloured maps.

This paper is the report of the work undertaken by the Institute of Endemic Diseases, Baghdad, in the development of a Malaria Control Programme in Iraq from 1947 to 1952. For descriptive purposes it is divided into 6 regions, each of which has special geographical and epidemiological features. The regions are further subdivided into districts related to the main river system. Thus the desert-steppe and submontane regions of north Iraq are divided into 3 districts, each of which forms part of the drainage system of either the Tigris, the Greater and Lesser Zab rivers, or the Dyala river. Likewise the region of the alluvial plain is sub-divided according to the river from which the lands of each district are watered.

The incidence of malaria is very considerably influenced by the river system of the Euphrates, the Tigris and Dyala. The floods of the Tigris and Dyala occur rather early in the summer and subside quickly whereas the Euphrates rises more slowly, reaches a peak almost a month later than the Tigris and subsides more gradually. Consequently seepage and inundation from the Euphrates are more likely to give rise to increased mosquito

population than the floods along the course of the other two rivers. Spring flood waters accumulate in the extensive marshy area in the triangle near Basra from which drainage takes place slowly over the early summer months through the Shatt al-Arab. High water levels in this waterway appear at a somewhat later period than in the main rivers and coincide with the peak breeding season of the local malaria vector, *A. stephensi*. Water-control schemes which are planned to come into operation in the near future will materially alter the hydrography of extensive areas of the plains country and this is expected to have unfavourable repercussions on the incidence of malaria in the newly developed tracts of country.

The regions referred to are: (i) Shatt al-Arab and Hammar; (ii) Alluvial plain; (iii) Syrian desert; (iv) Steppe desert; (v) Submontane; (vi) Zagros-Montane.

For each of the districts in these regions the following points are considered: (i) ecological features with notes on malaria and local vectors; (ii) administrative notes; (iii) the control work undertaken; (iv) results of control operations; (v) course of malaria in uncontrolled communities; (vi) scale of the operations in relation to the population.

Region (i) is the most prolific date-producing area in the world. The complex system of shallow channels which water the date plantations is affected by the ebb and flow tides of the Persian Gulf, both noticeable when the river levels are low. When the levels are high, the combination of tide and high water makes it necessary to close the outlets of the channels by earth bunds, the river flowing by at or above ground level; in consequence there is stagnation in the irrigation system together with an increase in volume of seepage water—ideal conditions for the local malaria vector, *A. stephensi*.

Antilarval measures dominate the control programme in urban and peri-urban localities: because of the mildness of the winter fortnightly oiling continues through this season.

Spleen indices show that a great reduction in the general malaria morbidity has been effected during the years under review but it is evident that transmission still occurs in urban centres during the height of the malaria season; it is hoped that the increased use of residual sprays in future will achieve eradication in these urban areas. In the uncontrolled communities, it is thought that a genuine general decline in endemicity has occurred in the period, the reason for which is uncertain.

In region (ii), mosquito breeding is favourably influenced by gravity-fed canal systems originating from the Euphrates barrage and the Kut barrage and by pump schemes for irrigation purposes. Abundance of water means plentiful potential anopheline breeding places. Under these circumstances *A. stephensi* is the principal vector and urban outbreaks of malaria have been traced to the breeding of this mosquito in wells or other domestic excavations.

In certain districts, *A. pulcherrimus* is exceedingly abundant and it is believed that a very low rate of malaria transmission can be provided by enormous concentrations of this species; alternatively the exceeding abundance of *A. pulcherrimus* may overshadow the relatively inconspicuous presence of *A. stephensi*. *A. superpictus* may appear along the Tigris north of Baghdad and has given rise to sharp epidemics of malaria in the autumn in agricultural communities. Small numbers of *A. sacharovi* in the environs of Baghdad city have been eradicated.

Baghdad has been largely cleared of malaria by the filling or drainage of semi-permanent breeding places and the clearing and oiling of the larger peri-urban swamps.

In region (iii), the Syrian Desert, there is little sign of malaria except in the spring-fed oases where the most important vector appears to be *A. stephensi*, though in the cooler weather *A. fluviatilis* may be met with.

Control work has not yet been undertaken in the remaining areas; for the regions i, ii, and iii, detailed tables are given of the annual progress of (a) the control work undertaken, (b) spleen rates from controlled communities and (c) spleen rates from uncontrolled communities. *R. Ford Tredre*

Ejercito, A. **Philippine National Malaria Control Programme.** *J. Philippine Med. Ass.* 1955, Jan., v. 31, No. 1, 1–17, 2 maps & 2 charts.

Malaria is mesoendemic in a large part of the Philippine Islands. In this paper, read to the second Asian Malaria Conference, the Director of the Malaria Control Project of the Department of Health of the Philippine Islands describes the organization necessary for control measures with the ultimate objective of the eradication of malaria from the Islands. This organization is based on the Malaria Control Unit which includes an operational and epidemiological section. There are 30 of these units. On the research side there is a malaria field centre and malaria control pilot project and an entomological team.

In the rural areas where houses are far apart, DDT residual house spraying is to be relied on against the vector *Anopheles minimus* var. *flavirostris*. Where it is to the advantage of agriculture, open and sub-soil drainage, reclamation of seepage areas, control of streams by a series of dams with spillways, automatic-siphonage, and other naturalistic methods are to be promoted. Human suffering is to be alleviated by a systematic, wide distribution of antimalarial drugs to the needy free of charge; this is to be accomplished by the setting up of dispensary outposts.

One of the difficulties is that *A. minimus* var. *flavirostris*, the principal vector, is known to be a wild and elusive species, primarily of outdoor habit, breeding along the indented borders of the shaded slow-flowing clear streams and resting in the moist crevices or vegetation along the banks of such streams; a very considerable part of the life span of this mosquito is spent in the vicinity of these streams. Investigations are to be conducted into the use of DDT residual spraying against these field resting places.

Lastly health education of the public must go hand in hand with the programme directed against malaria. *R. Ford Tredre*

Floch, H. Evolution de la lutte antipaludique en Guyane Française de 1950 à 1954. [**The Anti-Malaria Campaign in French Guiana in 1950–54**] *Arch. Inst. Pasteur de la Guyane Française. Publication No. 345.* 1954, Nov., 8 pp. [11 refs.]

Floch, H. La lutte antipaludique en Guyane Française: I.—L'anophelisme. [**The Malaria Campaign in French Guiana: I. Anophelism**] *Riv. di Malariologia.* 1955, June, v. 34, Nos. 1/3, 57–65. [12 refs.] II.—Remarques épidémiologiques sur le paludisme. [**II. Epidemiology**] *Ibid.*, 67–76. III.—Les campagnes de "Dédétisation" et leurs résultats. [**III. DDT Campaigns and their Results**] *Ibid.*, 77–92, 6 figs.

This series of papers contains much the same information as was contained in papers already published elsewhere, see this *Bulletin*, 1955, v. 52, 12, 511.

Weil, R. Zur Frage des Einflusses des Höhenklimas auf Hühnermalaria bei Blutinokulation mit *Plasmodium gallinaceum* Brumpt. [**Effect of High Altitude Climate on Fowl Malaria induced by Blood Inoculation of** *Plasmodium gallinaceum*] *Acta Tropica.* Basle. 1955, v. 12, No. 1, 53–66, 1 graph.

The author records further results of the work carried out at the Swiss Tropical Institute on the effect of altitude on the course of fowl malaria [see also this *Bulletin*, 1953, v. 50, 682; 1955, v. 52, 128.] Chickens were infected with *Plasmodium gallinaceum* by blood inoculation, 14 days after they had been adapted to an altitude of 3457 metres (in 1951), while controls were observed in Basle at 280 metres (in 1953). The course of infection proved to be qualitatively similar in both cases, though in chicks kept at high altitude it was milder, owing to the fact that in 1951 the strain was less virulent than in 1953. Though the effect upon the infection of blood changes due to altitude, such as the increase in the number of erythrocytes and in the colour index, could not be determined exactly, it was probably insignificant since in both series of experiments the exo-erythrocytic stages appeared after the same period of time (11 days), and the development of the blood forms was similar. It is thought that these changes were not responsible for the delayed course or suppression of the infection described by Herbig-Sandreuter [*ibid.*, 1953, v. 50, 682] in chicks inoculated with sporozoites. This phenomenon is attributed to the action of the defence mechanism of the reticulo-endothelial system upon the pre-erythrocytic stages of the parasite. *C. A. Hoare*

de Oliveira, M. X. & Meyer, H. *Plasmodium gallinaceum* **in Tissue Culture. Observations after One Year of Cultivation.** *Parasitology.* 1955, May, v. 45, Nos. 1/2, 1–4, 4 figs. on pl. [10 refs.]

The authors describe observations on tissue cultures of *Plasmodium gallinaceum*, which were grown in a medium consisting of (a) chick plasma diluted with an equal part of Tyrode or Ringer solution, and (b) diluted chick embryo extract, while the supernatant fluid was composed of (a) and (b) in the proportion 5 to 1. The medium was inoculated with brain fragments from chickens with exo-erythrocytic infection, and the culture was grown in roller tubes, with transfers to hanging drops for examination and permanent preparations, as well as for re-inoculation, after which cultures were again transferred to roller tubes, in which they remained 10–14 days. The alternation between hanging drops and roller tubes was repeated periodically.

In these cultures *P. gallinaceum* was maintained for 1 year, multiplying rapidly in cells of embryonic brain, liver and spleen, spreading to new host cells when phagocytosed by them, and undergoing the complete cycle of exo-erythrocytic schizogony, some stages of which are depicted in a plate of photomicrographs. When a tissue culture of *P. gallinaceum* is inoculated into a chick it first gives rise to an EE infection, but later the blood is also invaded. However, attempts to reproduce the erythrocytic cycle *in vitro* failed. It was found that the parasites can survive in tissue culture at room temperature for 23 days. *C. A. Hoare*

TRYPANOSOMIASIS

In this section abstracts are arranged as far as possible in the following order:—African—*human, animal;* American—*Chagas's disease and other trypanosome infections. In each form the following order is followed*:—*epidemiology, aetiology, transmission, pathology, diagnosis, clinical findings, treatment, control.*

Bureau Permanent Interafricain de la Tsé-Tsé et de la Trypanosomiase. Publication No. 206. Léopoldville (Congo Belge). **International Scientific Committee for Trypanosomiasis Research.** Fifth Meeting, held at Pretoria 13th to 17th September, 1954 [Alexander, R. A., Chairman]. pp. xxvi + 174. [1954.]

This is the report of the fifth meeting of the International Scientific Committee for Trypanosomiasis Research; it was held in Pretoria in September 1954, over a period of 4 days. The business of the committee was transacted, and papers were submitted for consideration. The first of these was a *Statistical review of trypanosomiasis in French West Africa from 1932 to 1954*, by A. Masseguin and J. Taillefer-Grimaldi; in it the history of the disease as a public health problem and the effect of measures taken to control it are detailed; the authors warn against relaxation of the effort to control both the disease and its vectors. A. J. Lotte, dealing with *The prophylaxis of sleeping sickness in aquatic regions*, concluded that mobile health services are a good economic proposition if properly operated. P. Mornet, in an account of *The pathogenic trypanosomes of French West Africa*, covered their distribution and frequency, and the incidence of domestic animal infection; he thought that mechanical transmission of *T. congolense* and of *T. brucei* can occur as it does in the case of *T. evansi*, to which *T. brucei* bears some resemblance. M. A. de Andrade Silva, A. Caseiro, R. P. Carmo and A. X. de Basto told of their experience with *Arsobal in the treatment of T. rhodesiense sleeping sickness*; this drug in their opinion is "a great advance over tryparsamide" and has proved effective in cases where the latter has failed; its disadvantage is its toxicity. A. R. Pinto described *A possible cause of error in the blood culture of Trypanosoma gambiense* in the form of already infected human or animal blood used in the preparation of the medium. Richet discussed *Diverse considerations on the prophylaxis of human trypanosomiasis in French Equatorial Africa.* E. A. Lewis published some *Notes on Trypanosoma vivax: its transmission by tsetses and by syringe passages.* J. Ford discussed the *Discriminative treatment of bush against G. morsitans*; and C. H. N. Jackson read a paper on *The availability of tsetse flies.* G. Neujean in his *Comparative value of the principal trypanocidal drugs in the treatment of T. gambiense sleeping sickness*, recorded the experiences of 6 years' work. In *Preliminary notes on the therapeutic value of Friedheim's M.F.S.* [an injectable preparation of MSbB], he states he found the preparation to be well tolerated and he believed it to be worthy of further trial. In conjunction with F. Evens and J. Stijns the same author contributed *Some notes on nervous invasion in "T. gambiense" sleeping sickness.* These authors with A. Kaeckenbeeck and F. Schoenaers discussed *The diagnosis of T. gambiense sleeping sickness and the complement fixation reaction.* F. Evens and C. Niewegeers gave short *Notes on the breeding and biology of Glossina palpalis.* M. Vaucel and H. Jonchère recorded *Observations made during the course of hybridization trials with different "species" of polymorphic trypanosomes*; *T. brucei* and *T. gambiense* were the parasites used and it

seemed that a *T. brucei* infection submerged a *T. gambiense* infection introduced simultaneously into animals. R. Beaudiment, L. Cauvin and Ph. Leproux dealt with *Accidents due to treatment with Lomidine in the French Cameroons—their therapeutics and prevention (Experiments with 4·891 RP)*. M. A. Soltys described the *Transmission of T. congolense by other vectors than tsetse flies*; and R. du Toit, E. B. Kluge and O. G. H. Fiedler *The eradication of Glossina pallidipes from Zululand by chemical means*; while J. A. T. S. Dias contributed *Some considerations about the control of Glossina austeni Newst. based on the knowledge of its ecology*. K. Unsworth recounted *Observations on the curative and toxic effects of ethidium bromide in zebu cattle infected with T. vivax*; and H. Fairbairn referred to *The prevalence in Nigeria and the morphology of, Trypanosoma vivax*. H. J. C. Watson described *The maintenance of a strain of Trypanosoma simiae in rabbits*; while D. Gall, M. P. Hutchinson and W. Yates considered *Hypergammaglobinaemia in T. gambiense sleeping sickness* and P. Gallais recorded a *Study of T. gambiense experimental trypanosomiasis in men*.

The papers are printed in English, many having been translated from the French. *A. R. D. Adams*

Lotte, A. J. L'Hygiène Mobile dans les zones aquatiques. [**Mobile Health Units in Aquatic Regions**] *Méd. Trop.* Marseilles. 1954, Nov.–Dec., v. 14, No. 6, 703–11, 1 map.

This paper has also been published in the report of the 5th meeting at Pretoria, in September 1954, of the International Scientific Committee for Trypanosomiasis Research. Its subject is the detailed means by which mobile medical teams can be conveyed by water and maintained afloat to effect survey, control and treatment, chiefly of sleeping sickness, in the coastal, lagoon, estuarial and riverine parts of French Equatorial Africa.
A. R. D. Adams

Pinto, A. R. da C. Relatório sobre a actividade da Missão de Estudo e Combate da Doença do Sono na Guiné Portuguesa referente ao ano de 1953. [**Report of the Work of the Sleeping Sickness Mission in Portuguese Guinea in 1953**] *Anais Inst. Med. Trop.* Lisbon. 1955, Mar.–June, v. 12, Nos. 1/2, 255–90, 1 map.

During the year 493,300 Africans, practically all of the people at risk from sleeping sickness, were examined, 1,793 cases were diagnosed, and 37,509 injections were given. Patients with previously diagnosed sleeping sickness, and many with other illnesses, were also treated, and chemoprophylaxis with pentamidine was given to 7,332 persons in the region of Cubisseco. The tsetse-fly control section, because of shortage of staff, was mostly occupied in diagnosis and treatment of human trypanosomiasis, and this section, in fact, examined 144,067 persons and diagnosed 379 cases. This section also dissected 526 *Glossina palpalis*, finding 13 infected with trypanosomes (12 in the proboscis and 1 in the gut).

Of the new cases of trypanosomiasis discovered, 24·3 per cent. showed trypanosomes on examination of gland juice or blood, 27·3 per cent. are described as in the latent stage, 41·7 per cent. had infection of the nervous system, and in 6·7 per cent. the stage could not be determined. Most of the patients were adult, and there were rather more males than females.

As is usual, much other medical work was done by the Mission, and a list is given of the general diseases treated, and the number of patients. Hookworm infection, anaemia, gonorrhoea, yaws, bronchitis, conjunctivitis, diarrhoea, scabies (especially), infected wounds, malaria, rheumatism and tropical ulcer were the most common of these affections.

A list is given of the members of the staff of the mission, and there is a remark that it is not up to strength. *Charles Wilcocks*

Rageau, J. & Adam, J. P. Répartition des glossines au Cameroun français (1953). [**Distribution of Tsetse Flies in the French Cameroons (1953)**] Reprinted from *Rev. d'Élevage et de Méd. Vét. des Pays Trop.* 1953, v. 6, No. 2, 73–6, 1 folding map. [19 refs.]

A map and text present in some detail the known distribution in the French Cameroons of 11 species of tsetse fly: *Glossina palpalis*, *G. caligínea*, *G. pallicera*, *G. newsteadi*, *G. tachinoides*, *G. morsitans submorsitans*, *G. longipalpis*, *G. fusca* and var. *congolensis*, *G. haningtoni*, *G. fuscipleuris*, and *G. tabaniformis*. *G. palpalis* is the widespread species in the south but its true northern limit, shown provisionally on the line Banyo-Tibati-Bétaré-Oya, requires further observation. Delineation of the distribution of this species and its subspecies *fuscipes* is as yet undetermined. *G. tachinoïdes* supplants *palpalis* in the north and there is in northern savannah a wide distribution of *G. morsitans submorsitans*. Other species are localized. The Adamawa Highlands cutting across the territory give a fly-free zone between the north and south, since tsetse flies have not been taken over about 3,600 ft. altitude. *D. S. Bertram*

Potts, W. R. **A New Tsetse-Fly from the British Cameroons.** *Ann. Trop. Med. & Parasit.* 1955, June, v. 49, No. 2, 218–26, 4 text figs. & 5 figs. on pl.

Glossina nashi sp.nov. is described from material from the British Cameroons. It is of the *fusca* group. Both male and female are very fully described, with line drawings and photographs and salient linear measurements. Types are lodged with the British Museum (Natural History), London, and a paratype of each sex in the West African Institute for Trypanosomiasis Research, Kaduna, Northern Nigeria.

The specimens (5 in all) were taken between Mamfe and Kumba, British Cameroons, in hilly forest territory together with *G. haningtoni* and probably also *G. tabaniformis*. *G. nashi* has been taken on cattle, once actually feeding.

The key to tsetse species in the recent monograph, *The Natural History of Tsetse Flies*, by Professor Buxton [this *Bulletin*, 1955, v. 52, 853] should now be brought up-to-date to include this new species by this alteration:—

(a) Last two segments of mid-tarsi entirely pale; pleurae and hind coxae fuscous grey...*G. severini*.

(b) Dark band on hind margin of penultimate segment of hind tarsi, and last segment entirely dark dorsally, in marked contrast to pale colour of remainder; pleurae and hind coxae pale to yellowish-brown...*G. nashi*. *D. S. Bertram*

Pinto, A. R. Novos dados sobre a mielocultura na doença do sono. [**New Data on Bone-Marrow Culture in Sleeping Sickness**] *Anais Inst. Med. Trop.* Lisbon. 1954, Sept.–Dec., v. 11, Nos. 3/4, 577–9. English summary (4 lines).

In certain stages of sleeping sickness the parasitological diagnosis of the disease is hampered by the extreme scarcity of trypanosomes in the blood and lymph. To overcome this difficulty the author had resorted to cultures of the bone-marrow, obtained by sternal puncture.

For this purpose he used Henrard's modification of Weinman's medium, consisting of 3 gm. agar dissolved in 1 litre saline, and 1 per cent. citrated human blood obtained from 4 donors. The medium was distributed in test-tubes, each containing 4 cc. agar-saline and 2 cc. blood from a different donor. Each tube was then inoculated with 1 cc. of sternal blood recovered in a syringe containing 1 per cent. of " Liquoide Roche ".

The results, in a group of 10 patients in different stages of the disease, were assessed on the 10th day after inoculation of the tubes, with the result that growth of trypanosomes was found to have taken place in all these cases. *C. A. Hoare*

Debeir, O. Troubles oculaires et amblyopie toxique au cours du traitement de la trypanosomiase humaine africaine. [**Eye Complications and Toxic Amblyopia during Treatment of Human Trypanosomiasis in Africa**] *Ann. Soc. Belge de Méd. Trop.* 1954, Dec. 31, v. 34, No. 6, 841–74.

According to a recent report of the United Nations there are more than a million patients under treatment every year for trypanosomiasis. Except for lesions of the optic nerve, the ocular complications are very rare and when they do occur are not serious and clear up rapidly on treatment. They take the form of mild optic neuritis with transitory vascular changes. The authors have never seen a patient become blind from trypanosomiasis other than those under treatment with pentavalent arsenic which is a frequent cause of serious lesions of the optic nerve often ending in blindness. For a period of two years they have observed 127 patients undergoing the standard treatment adopted in the Belgian Congo with tryparsamide, 12 weekly injections (one of 3 gm.; one of 2·5 gm.; and 10 of 2 gm.) for an adult of average weight. Eight of these patients developed mild and 16 serious ocular complications. They found that treatment with tryparsamide is an important cause of blindness in the Congo and patients in the late stage and those suffering from an accompanying syphilis are more prone to the toxic action of this drug. Treatment with combined tryparsamide and Moranyl [Suramin, Antrypal] would appear to be not more toxic than treatment with tryparsamide alone and the addition of sodium thiosulphate does not appear to have any protecting rôle. Ocular symptoms come on some weeks or months after treatment. Sudden amaurosis is uncommon. Loss of vision is due to degeneration of the ganglionic cells of the retina.

Treatment consists in stopping the injections of tryparsamide as soon as eye symptoms appear. Lumbar punctures, paracenteses of the anterior chamber of the eye, vasodilators, have not proved of much use. Certain workers have published good results with BAL. Early treatment of ocular manifestations often brings about a quick return of central vision.

Apart from the obvious precautions relating to the use of tryparsamide, it is pointed out that the best prophylaxis of eye complications is to use Arsobal instead.

The various aspects of the subject are discussed at length.

E. W. O'G. Kirwan

Masseguin, A., Causse, M. & Ricosse, M. Note préliminaire sur l'association Lomidine-Moranyl, dans la prévention de la maladie du sommeil. [**Preliminary Note on the Combination of Lomidine with Moranyl in the Prophylaxis of Sleeping Sickness**] *Bull. Soc. Path. Exot.* 1955, v. 48, No. 1, 36–7.

At Kagnarou, a village of 1,000 inhabitants in French West Africa, regular examinations between 1948 and 1952 disclosed not more than 4 new cases of sleeping sickness each year. Usually 85 per cent. of the inhabitants were examined, but in 1952 only 45 per cent. of the population attended for this purpose. In 1953, when 80 per cent. of the population attended, 13 new cases were discovered. Immediate preventive treatment with Lomidine [pentamidine dimethane sulphonate] was instituted [presumably for all the people]; as twice yearly injections of Lomidine are difficult to enforce, it was decided to give both Moranyl [antrypol BP] and Lomidine. The Moranyl was given as a 10 per cent. solution intramuscularly, at a dose of 2 cc./kgm., and the Lomidine, also given intramuscularly, as a 4 per cent. solution at a dose of 4 mgm./kgm. of body weight. The combined treatment was begun in September 1953; 5 months later there were no new cases, and also 8 months later there were none. Thereafter monthly controls were done, and up to December 1954 no new cases had appeared.

A similar experiment was performed at another village of 542 inhabitants with a similar result. Thus in two villages where the index of definite cases was high (2·02 per cent. and 1·3 per cent.), absolute protection against further infection was obtained for periods of 15 and 12 months of close study. The observation is significant though not conclusive, and a study of 180,000 other persons similarly treated was begun in September 1954 in very highly infected villages in French West Africa. In this experiment the Moranyl is being given intravenously or intramuscularly in doses of 0·02 gm./kgm., with a ceiling of 1 gm.; the urine of each patient is examined before the drug is given. The Lomidine is given intramuscularly at a dose of 4 mgm./kgm. The advantage of the method is the long period of protection afforded; its disadvantage is the labour and time involved, chiefly due to the need for urine examinations. *A. R. D. Adams*

Desowitz, R. S. & Fairbairn, H. **The Influence of Temperature on the Length of the Developmental Cycle of** *Trypanosoma vivax* **in** *Glossina palpalis*. *Ann. Trop. Med. & Parasit.* 1955, June, v. 49, No. 2, 161–3.

"Ninety-two *Glossina palpalis*, which had emerged from pupae kept at 26°C., were fed once on a sheep infected with *Trypanosoma vivax* and were then kept in an incubator at a mean maximum temperature of 29°C. The trypanosome cycle was completed in five days.

"Eighty-eight *G. palpalis*, which had also emerged from pupae kept at 26°C., were likewise fed once on a sheep infected with *T. vivax* and were then kept in an incubator at a mean maximum temperature of 22°C. The trypanosome cycle was completed between the 12th and 13th days."

Jaroslow, B. N. **The Effect of X Irradiation on Immunity of the Mouse to** *Trypanosoma duttoni*. *J. Infect. Dis.* 1955, May–June, v. 96, No. 3, 242–9, 4 figs. [16 refs.]

Cantrell, W. **The Effects of Cortisone and Oxophenarsine on *Trypanosoma equiperdum* Infections in the Rat.** *J. Infect. Dis.* 1955, May–June, v. 96, No. 3, 259–67, 12 figs. [33 refs.]

Pifano C., F. El diagnóstico parasitológico de la enfermedad de Chagas en la fase crónica. Estudio comparativo entre la gota gruesa, el xenodiagnostico, el hemocultivo y las inoculaciones experimentales en animales sensibles. [**Parasitological Diagnosis of Chagas's Disease in the Chronic Phase**] *Gac. Méd. Caracas.* 1954, Nov.–Dec., v. 62, Nos. 11/12, 629–37.

The author compares and evaluates the following methods for the parasitological diagnosis of Chagas's disease, employed in Venezuela: thick blood film, xenodiagnosis, blood culture and inoculation of susceptible animals. [A full account of this comparative study was given in another publication: see this *Bulletin*, 1955, v. 52, 880.] *C. A. Hoare*

Peñalver, L. M. & Villagran L., E. Experimentos con el insecticida Dieldrin en la lucha antitriatomidea. [**Experiments with Dieldrin in the Control of Triatominae**] *Bol. Oficina Sanitaria Panamericana.* 1955, Feb., v. 38, No. 2, 127–40, 6 figs. [32 refs.] English summary.

Chagas's disease is one of the more important public health problems in Guatemala. It is transmitted by bugs of the family Reduviidae (Triatominae) especially *Triatoma dimidiata*, *T. nitida* and, to some extent *Rhodnius prolixus*. These insects heavily infest many poorly constructed dwellings in rural areas. The most hopeful line of attack is to destroy the vectors by residual insecticides. DDT is not particularly effective against them and the widespread DDT spraying campaigns in South America against mosquitoes have not affected the *Triatoma* populations. The insecticide gamma BHC has been much more successful, and spraying programmes at intervals of 6 months have reduced bug populations by 90 per cent. in some parts of Brazil. However, in other areas, BHC has been rather less effective and attention was drawn to the newer insecticide dieldrin.

The authors conducted laboratory tests by exposing bugs of various species, in different stages of the life cycle, to filter papers treated with dieldrin. The eggs were not affected but nymphs and adults were quite sensitive. Even 10 minutes' exposure to 1 gm./m^2 gave complete mortality at different intervals after treatment. *T. dimidiata* nymphs were the most resistant type of insect tested.

Field trials were arranged to investigate the practical efficacy of dieldrin. In the area chosen, a survey proved 68 per cent. of the houses to be infested (70 per cent. by *T. dimidiata*, 30 per cent. by *R. prolixus*).

The houses were sprayed at the rate of 1 gm./m^2 of dieldrin wettable powder (50 per cent. active principle) and a special area was treated at double this rate. Altogether 1,587 rooms were treated as well as their exterior walls. In later inspections, 3,682 bugs were collected in about the proportions of the survey. After 2 to 5 days the insecticide achieved complete eradication of Triatomid bugs, which was maintained for at least 4 months afterwards. Observations are being continued. *J. R. Busvine*

LEISHMANIASIS

In this section abstracts are arranged as far as possible in the following order:—visceral, cutaneous, muco-cutaneous.

Kirk, R. & Lewis, D. J. **Studies in Leishmaniasis in the Anglo-Egyptian Sudan. XI.** *Phlebotomus* **in relation to Leishmaniasis in the Sudan.** *Trans. Roy. Soc. Trop. Med. & Hyg.* 1955, May, v. 49, No. 3, 229–40, 3 maps. [56 refs.]

The authors bring up to date our knowledge of leishmaniasis in the Sudan, a subject on which their own contributions have been large. They discuss in particular the relation of these diseases to species of *Phlebotomus*.

Oriental sore or cutaneous leishmaniasis occurs along the banks of the Nile, north of Khartoum: it is significant that it has also been recorded in Upper Egypt. It has also been recorded in the Sudan west of the Nile in Darfur and the Nuba Mountains. On grounds of geography it is presumed that the principal vector is *Phlebotomus papatasi*. No experimental work has been carried out.

As to kala azar, it occurs south of Khartoum in four endemic areas, sporadic cases being reported from other localities. The distribution is shown on a map. Muco-cutaneous cases occur which are regarded in this part of the world as a particular manifestation of kala azar. As to the transmission of kala azar, the authors review previous work in the Old World and point out the extraordinary difficulty that has attended attempts to demonstrate transmission by the bite of *Phlebotomus*, though for so many years evidence has been accumulating that that bite is the channel of infection both in kala azar and in oriental sore. Indeed, it is only in India that the transmission of kala azar by bite (of *Phlebotomus argentipes*) has been demonstrated. In other areas the vectors have been identified either on grounds of geography and epidemiology, or by observing the development of the flagellates in the insect.

Much work has been carried out on the transmission of kala azar in the Sudan since a Commission to study the subject was formed in 1909, but it is only within the last few years that, thanks to the present authors, an adequate knowledge has been acquired of the species of *Phlebotomus* occurring in the area and particularly of those which bite man. The authors show that there are grounds for suspecting *P. orientalis* which occurs in most of the areas where kala azar is found. Until recently the species was held to be rare because it was seldom found on pieces of oiled paper. But now that net traps are used with a human bait it has become apparent that *P. orientalis* is by no means scarce. The species belongs to the *major* group which is an additional reason for suspecting it. *P. clydei* bites man and occurs in most of the kala azar areas. It is common out of doors rather than in houses, and is often caught in rodent burrows. If the infection can be maintained in non-human hosts (and there has been a suggestion that this may be so in the Sudan), then *P. clydei* might well be the vector. A small number of experiments are described in which *P. orientalis*, *clydei* and others were fed on kala azar patients and dissected at intervals. The experiments are hardly conclusive. *P. A. Buxton*

See also p. 1151, Mitra, Notizen über Phlebotomen. Phlebotomen der West-Ghats. [**Notes on** *Phlebotomus* **of the Western Ghats, Bombay State**]

Guimarães, N. A. & Silva, Y. Leishmaniose primitiva de localisação genital e peri-genital. [**Primary Lesions of Leishmaniasis in the Genital and Peri-Genital Region**] *Bol. Hosp. Clín. Facul. Med. Univ. Bahia.* 1955, Jan., v. 1, No. 1, 17–25, 4 figs.

The English summary appended to the paper is as follows:—

"Report is made on two cases of tegumentary leishmaniasis in which the sites of the primary lesions were quite unusual. They were located on the vulvar great folds in one case and on the vulva and perineal region in the other case.

"These cases are also of interest since they occurred in very young girls, one aged 5 years and the other being only 20 months old.

"It is also worth while to note that these children, in spite of their low ages, got through treatment (N-methil-glucamine-anthimoniate) with no toxic manifestations and the lesions healed in a relatively short time."

[See also this *Bulletin*, 1931, v. 28, 163.]

Adler, S. & Halff, Lilian. **Observations on *Leishmania enriettii* Muniz and Medina, 1948.** *Ann. Trop. Med. & Parasit.* 1955, Mar., v. 49, No. 1, 37–41, 4 figs. on pl. [11 refs.]

The authors describe miscellaneous observations on *Leishmania enriettii*, the South American parasite of guineapigs, which was grown in NNN cultures. Cutaneous lesions containing parasites were produced in guineapigs by subcutaneous inoculations, while cutaneous metastatic lesions appeared in different parts of the body, in both animals inoculated by this route and those inoculated intraperitoneally. Infection of the unbroken skin, similar to that in dogs infected with *L. donovani* (= *L. infantum*) was also observed. Inoculation of suckling mice with cultures of *L. enriettii* and with parasites from guineapig lesions produced transient infections. The parasites in the mice invaded the macrophages and fibroblasts in the areolar subcutaneous connective tissue, while in one mouse they were also seen in the spleen. *C. A. Hoare*

FEVERS OF THE TYPHUS GROUP

In this section abstracts are arranged as far as possible in the following order:—general; louse-borne typhus, flea-borne typhus, mite-borne typhus; rickettsialpox; tick-borne typhus; Q fever, other rickettsial diseases.

Giroud, P., Roger, F. & Dumas, Nicole. Contribution à l'étude des néo-rickettsioses. L'évolution des anticorps au cours des diverses maladies de l'homme et des animaux. [**A Contribution to the Study of the Neo-Rickettsioses. The Development of the Antibodies in the Different Diseases caused by them in Man and Animals**] *Bull. Soc. Path. Exot.* 1955, v. 48, No. 1, 21–4.

In the course of their studies of the antibodies of *Rickettsia burneti* the authors became interested in the investigation of the important part played by a group of organisms, situated close to the border line of the rickettsiae, which caused a great variety of disease syndromes. The name neo-ricksettsiae is proposed for these organisms. They are filterable through

Chamberland L3 candles and so can be freed from bacterial contamination when grown in tissue cultures and thereby made available for inoculation of experimental animals. Strains have been recovered from man, cattle, sheep, goats and dogs in various countries, including Africa, Central America, the Far East and Europe.

In man the types of disease caused by them include exanthematic, pseudo-influenzal, pulmonary and vascular syndromes. The vascular lesions may be local or diffuse types of arteritis.

The serological reactions of 6 strains have been studied. Strain X.14 was from a European child with an exanthematic fever; V.14 was from an African who died of encephalopericarditis; both of these were from the Belgian Congo. Strain X.15 was from a woman in Paris who had a purely neurological syndrome. Strain C.16 was from a patient with hepatitis. Strain Y.15 came from a sheep which had aborted, and strain S.15 from a cow with encephalitis.

The presence of antibodies was detected in acute cases by a special complement-fixation test [this *Bulletin*, 1955, v. 52, 29], which showed a rapidly rising and falling titre; the reaction becoming positive about the 10th to the 15th day and reaching its maximum about the 30th to the 40th day. In some cases, especially those with arteritis, the reaction remained positive for long periods. In some epidemics among cattle and dogs in which there was a pulmonary syndrome at the outset there was sometimes a secondary neurological syndrome accompanied by a disappearance of the positive reaction. The information supplied in this brief paper is of a general nature; it suggests that there is a heterogeneous group of morbid conditions associated with the presence of organisms related to the rickettsiae.

John W. D. Megaw

Placidi, L. & Santucci, Y. Le chien et les affections exanthématiques. La réaction de Weil-Félix chez le chien de la région marseillaise. [**The Part played by the Dog in Typhus-Group Fevers. The Weil-Felix Reaction in Dogs of the Marseilles Region**] *Maroc. Méd.* 1954, Nov., v. 33, No. 354, 1036–9. [Refs. in footnotes.]

Sera of 170 dogs from the Marseilles region were tested for agglutinins of *Proteus OX19* and *OXK*. The dogs were collected from different localities; 80 were from pounds in the city, 20 from the suburbs, 20 from the coastal zone, 25 from rural areas of Upper Provence, and 25 were young dogs, a few months old, from various localities.

The only significant differences in the titres observed in the various groups were that the young dogs gave negative reactions or feeble reactions not exceeding 1 in 20.

Among the 80 dogs from the city 15 (18 per cent.) reacted at titres of 1 in 120 to 1 in 400, the titres being slightly higher with *Pr. OX19* than with *Pr. OXK* in most cases; 65 reacted at 1 in 10 to 1 in 100, and there was no significant difference in the titres with the two strains.

The author notes that the study would have been of greater value if the results had included the findings in tests with the rickettsia-agglutination and complement-fixation reactions against the different rickettsial antigens.

The paper contains a very useful documented summary of the findings reported by a large number of workers who have studied the problem of the rôle of the dog as a possible reservoir of rickettsial infections. References are given to 15 papers on the subject. *John W. D. Megaw*

Nicolau, C. T., Ţonea, T., Guta, A. & Cuvin, Maria. Cercetări asupra modificărilor frecvenţei cardiace în tifosul exantematic. [**Studies on Changes in the Heart Rate during Epidemic Typhus**] *Rev. Fiziologic Normală şi Patologică.* Bucharest. 1955, Apr.–June, v. 2, No. 2, 100–121, 1 chart. [Numerous refs.] French summary.

The authors, in Rumania, studied the heart rate in 48 cases of epidemic typhus, and state that the febrile tachycardia is determined by extra-cardiac accelerating stimuli acting on the myocardium and by the properties of the myocardium itself.

The heart rate increased progressively during the first week, reaching its maximum in mild cases about the 7th day and returning rapidly to normal about the 15th. In severe cases, it increased in the second week, with the maximum about the 11th day, or occasionally later, and returned to normal later and more slowly, even persisting into defervescence. This rapidity of the heart rate is directly related to the degree of the infection.

It was found that in parasympathicotonia, the heart rate was less increased, and related changes of increase or diminution occurred in the volume, peripheral resistance, muscle tone of the arteries and arterial tension. Reverse effects occurred in sympathicotonia.

The heart rate was variable in fatal cases. Before death it was about the same as that in non-fatal severe cases. When tachycardia was moderate, it was of favourable prognostic significance, so long as no other serious signs were present. Parasympathicotonia predominated in fatal cases towards the end.

The dissociation between heart rate and temperature denotes a febrile peripheral circulatory insufficiency determining both the fall of temperature and the production of accelerating stimuli. There may then be a myocardial insufficiency, resulting from this circulatory insufficiency, which profoundly affects the functions of the whole organism. *H. J. O'D. Burke-Gaffney*

Placidi, L. & Santucci, J. La réaction de Weil-Félix chez le porc de la région provençale. [**The Weil-Felix Reaction in Pigs in the Provence Region**] *Maroc. Méd.* 1954, Nov., v. 33, No. 354, 1040.

After a short discussion of the literature on serological and other experimental studies of pigs in relation to rickettsial infection, the authors describe a study of the sera of 97 apparently healthy pigs from abattoirs in Provence. They carried out Weil-Felix tests with *Proteus OX19* and *OX2* antigens. Agglutination titres were comparable with both strains.

Of the 97 sera, 15 were weak or negative, 70 were positive at titres between 1 in 50 and 1 in 100, one each at 1 in 200 and 1 in 300, and 10 at 1 in 500.

It is concluded that the Weil-Felix reaction seemed to have little significance in the case of sera from pigs. *H. J. O'D. Burke-Gaffney*

Greiff, D., Donahoe, H. B., Chiga, M. & Pinkerton, H. **The Effects of PABA Derivatives on the Multiplication of Typhus Rickettsiae.** *J. Immunology.* 1955, Jan., v. 74, No. 1, 32–6. [18 refs.]

Eggs were inoculated with *Rickettsia mooseri* on the 5th day of incubation, and on the 7th different amounts of the compounds under investigation were injected: 4 types of effect were distinguished, toxicity to the embryo (90 per cent. dying within 2 days) and complete, partial and no inhibition of

rickettsial multiplication. The amount of *p*-aminobenzoic acid giving complete inhibition was 1·7 mgm. None of the derivatives tested possessed this degree of activity, and many were toxic, with or without a partial inhibitory effect in the next lower dose. The derivatives were of 4 classes: isosteres of *p*-aminobenzoic acid, of which *p*-methylbenzoic acid was next in activity, and 6-hydroxybenzoic acid was purely toxic: *p*-halobenzoic acids, in which the order of therapeutic merit was I, Br, Cl, F: *p*-alkoxybenzoic acids, in which the order of activity increased with the length of the carbon chain, *p*-pentoxybenzoic acid being the most active: lastly, compounds with substitutions for the carboxyl group, of which three were very toxic and only *p*-aminohippuric acid had any anti-rickettsial activity. *L. P. Garrod*

Ogata, N. Über die Entdeckung des Erregers der Tsutsugamushi-Krankheit und die Nomenklatur desselben. [**The Discovery and Nomenclature of the Causative Agent of Tsutsugamushi Disease**] *Zent. f. Bakt.* I. Abt. Orig. 1955, v. 163, Nos. 2/3, 149–53, 1 fig.

The first part of this paper consists of a short description of the history and symptomatology of tsutsugamushi disease which is said to have been known to the Chinese more than 1,000 years ago. The word *tsutsuga* means disease and *mushi* means mite, so that the association between the disease and mites is no new discovery.

In the second part the author describes his discovery and isolation, in 1927, of the causative agent which has since then been known as *Rickettsia tsutsugamushi*. The isolation was by inoculation of a patient's blood into the testicle of a rabbit; no reaction was caused, and at the end of 3 weeks a suspension of the infected testicle was inoculated into the testicle of another rabbit. After 5 such passages at intervals of 3 weeks there was swelling of the testicle and rickettsiae were found in histiocytes in smears of the organ. In further passages the same results were obtained till the experiments were interrupted by the illness of the author's assistant who contracted a laboratory infection with the disease. A preliminary communication was made to the Society of Hygiene of Tokio in 1927. Infective material was sent later to various laboratories in Japan and the findings were confirmed. More than 40 cases of laboratory infection occurred among the workers who studied the strain so that no doubt remained regarding the identity of the rickettsia.

Three years later Nagayo *et al.* cultivated the same organism in the anterior chamber of the rabbit's eye and named it *Rickettsia orientalis*. A year later, in 1931, Kawamura isolated it by intraperitoneal inoculation of the guineapig and called it *Rickettsia akamushi*.

The correct name of the organism is therefore claimed to be *Rickettsia tsutsugamushi* Ogata 1927.

Reference is made to a description of a causative organism by Hayashi in 1920 under the name *Theileria tsutsugamushi* but no comment is made on its possible connexion with the disease though some authorities seem to accept it as the cause in spite of its being wrongly classified. This view is apparently the reason for the nomenclature adopted in Bergey's *Manual of Determinative Bacteriology* (1948) in which, as quoted by the author, priority is given to the name *Rickettsia tsutsugamushi* (Hayashi) Ogata. The author appears to deny Hayashi's right to credit for the discovery on the ground that the name *Rickettsia tsutsugamushi* is not mentioned in his original publication. *J. Megaw*

Morikawa, Y. & Yamaguchi, T. **On the Tsutsugamushi (Trombiculid Mites) in Shikoku Island (1).** *Tokushima J. Exper. Med.* 1954, Mar., v. 1, No. 1, 34–6.

This is a collector's list of different small rodents taken on the island in 1953–54 and the species of trombiculid mites ("tsutsugamushi" is used synonymously for "trombiculid mites") on them. Rodents were *Apodemus speciosus*, *Rattus norvegicus*, *Crocidura russula dsinezumi* and the moles *Urotrichus talpoides* and *Mogera wogura*. Trombiculids numbered 10,159 specimens (on 348 animals) and comprised 14 species of *Trombicula* (but not *T. akamushi* or *T. deliensis*), *Gahrliepia saduski*, *Euschöngastia ikaoensis*, *E. alpina* and *Acomatacarus* sp.

In one of the 3 Prefectures included in the survey, there were endemic foci of scrub typhus, but *Rickettsia orientalis* could not be found in any of the mites; 2 of the species found, *Trombicula pallida* and *T. tosa*, are said to be "most doubtful" vectors of scrub typhus in that area.

D. S. Bertram

Balducci, D. & Felici, A. Contribution au diagnostic expérimental de la fièvre boutonneuse. [**A Contribution on the Laboratory Diagnosis of Boutonneuse Fever**] *Ann. Inst. Pasteur.* 1955, July, v. 89, No. 1, 128–30.

The results of Weil-Felix and complement-fixation tests of 6 patients diagnosed as having boutonneuse fever are described. In each case the serum was tested during the height of the fever and again about 15 days later.

With the Weil-Felix test (*Proteus OX19*) 4 of the patients gave negative responses with the first test and reacted at titres ranging from 1 in 20 to 1 in 160 with the second test; the other 2 reacted at 1 in 320 with the first test and at 1 in 640 and 1 in 1,280 respectively with the second test. In the complement-fixation tests, among the various antigens used the most consistent results were obtained with *Rickettsia akari* of rickettsialpox. With this all the sera gave negative reactions at the first test but at the second all gave definitely positive reactions, of which 5 were at 1 in 128 and 1 was at 1 in 64.

With Rocky Mountain spotted fever antigen all were negative at the first test and only 2 reacted at the second test, one at 1 in 32 and the other at 1 in 64.

With epidemic typhus antigen 4 sera gave completely negative reactions and 2 had insignificant titres rising only to 1 in 8. With murine typhus antigen all the sera remained completely negative. With Colorado tick fever antigen 3 remained negative; 2 had a titre rising to 1 in 8 and in 1 the titre rose to 1 in 128. With Q fever antigen 3 remained negative, 2 had a titre rising to 1 in 16 and 1 had a titre rising to 1 in 8.

The remarkably consistent reactions with *R. akari* antigen are not regarded as indicating that the disease is rickettsialpox, which does not occur in the Mediterranean region and does not give a positive reaction with the Weil-Felix test. The close antigenic relationship with rickettsialpox which is shown by the present cases does not surprise the authors, who point to the affinities known to exist between the antigens of rickettsiae in general and those of the rickettsial agents of fevers of the Rocky Mountain spotted fever group in particular.

[The complement-fixing antigen of *R. akari* is now generally regarded as being indistinguishable from that of *R. rickettsi* of Rocky Mountain spotted fever; the findings recorded in the present paper and in several recent papers

suggest that a similar close relationship may exist between the antigens of *R. akari* and those of *R. conori* and the other varieties of rickettsial agents of the old-world forms of tick-borne typhus fevers. Evidence in support of this suggestion will be found in papers by Gear [this *Bulletin*, 1955, v. 52, 261], Sampaio and Faia [*ibid.*, 756] and Pope [below, p. 1069].

It is to be hoped that *R. akari* will be included, when possible, among the antigens employed in complement-fixation tests for suspected rickettsial infections. *John W. D. Megaw*

Pope, J. H. **The Isolation of a *Rickettsia* resembling *Rickettsia australis* in South-East Queensland.** *Med. J. Australia.* 1955, May 21, v. 1, No. 21, 761–3.

From the patient whose case is referred to in the next abstract rickettsiae were recovered at the 3rd serial passage through mice. Recoveries were made from 13 out of 94 mice inoculated up to the 11th passage, and 34 of the mice had enlargement of the spleen. Among 65 of the inoculated mice which were observed for 30 days or more there were only 3 deaths and in 2 of these there was bacterial infection.

Among guineapigs inoculated with the patient's blood some developed slight febrile reactions in the course of 8 passages during which there was no increase in the consistency of the reactions and no scrotal reaction occurred. Of 10 guineapigs tested during convalescence after inoculations of the 1st to the 8th passages, 5 gave complement-fixation reactions—4 at 1 in 8 and 1 at 1 in 16—with *Rickettsia akari* antigen; none reacted with *R. mooseri* or *R. burneti* antigens.

Guineapigs inoculated with infective material from mice of the 3rd passage developed febrile and scrotal reactions, sometimes severe.

Rickettsiae were isolated by yolk-sac culture from mice of the 4th passage. By the 5th yolk-sac passage the survival time of the chick embryos had become reduced from 6 days to 4 days but there was no increase in the virulence for mice of the rickettsiae contained in the successive yolk sacs.

Serum from the patient was tested on the 8th and 21st days; on both days the complement-fixation test with antigens of *R. akari*, *R. mooseri* and *R. burneti* gave negative reactions. Agglutination tests with *Proteus OX19* gave a negative response on the 8th day and a positive at 1 in 256 on the 21st day; the reactions with *Pr. OXK* were negative on both days. The rickettsia was provisionally accepted as a strain of *Rickettsia australis*, the causative organism of Queensland tick typhus. *John W. D. Megaw*

Neilson, G. H. **A Case of Queensland Tick Typhus.** *Med. J. Australia.* 1955, May 21, v. 1, No. 21, 763–4.

Altogether 16 cases of Queensland tick typhus have been reported but the present one is the first to be diagnosed for 6 years. The patient was a boy aged 16, who was bitten by a tick on the left parietal region of the scalp on September 5, 1954, while picnicking in a known focus of infection about 50 miles from Brisbane. The tick was not detached till 8 days later. The first symptom appeared after 11 days' incubation when there was soreness of the left side of the neck. On the following day there was shivering and the patient felt ill. During the next 2 days there was headache with photophobia and swelling round the left eye. The temperature at this time varied between 101° and 102°F. When admitted to hospital on the 5th day of the illness there was a pink papule at the site of the bite and the local lymph

nodes were enlarged and tender. There were about 20 pinkish papules scattered over the trunk and limbs; a few of the papules were surmounted by a small bleb containing clear fluid. The temperature was 101°F. The patient did not look severely ill. Two days later the papules had increased in number to about 40 and there was mild conjunctivitis. On the following day a patchy exudative pharyngitis appeared; this soon became ulcerative but was completely healed after 13 days. The fever lasted about 7 days. The rash disappeared within 8 days. The serological reactions are described in the preceding abstract.

The author thinks it likely that the disease is more common than is suggested by the number of cases reported: the mildness of most of the attacks may be the cause of their being overlooked. *John W. D. Megaw*

Blanc, G. Épidémiologie de la Q fever (coxiellose). [**The Epidemiology of Q Fever (Coxiellosis)**] *Maroc Méd.* 1954, Nov., v. 33, No. 354, 1021–5, 1 fig. [16 refs.]

This paper consists of an admirably clear and succinct summary of the contents of the 13 papers written by the author, mostly in collaboration with colleagues, since 1946, on Q fever. The chief features of the epidemiology of the disease are happily illustrated by a triptych the central panel of which is occupied by the tick, which is regarded as the real reservoir of infection though it plays a negligible part in the transmission of the disease to man. The panel on the right shows the wild vertebrates which have been found naturally infected—the bandicoot, the merion, and the rabbit. These are regarded as being unable to infect human beings either by direct contact or by the bites of their infected ticks. On the third panel are shown the domestic animals from which infection is transmitted to man, directly or indirectly, in the generally recognized ways, especially through inhalation of infected dust. Mention is also made of the appreciable part played by the dried faeces of infected ticks in causing infection through being inhaled in dust.

No mention is made of the point stressed in previous papers that human infection is surprisingly rare in localities in Africa in which infected ticks are incredibly numerous.

A list is given of 18 ticks found naturally infected; 16 of these are Ixodidae, the other 2 are Argasidae; the author and his colleagues have been the first to discover infection in 7 of these species.

[In a footnote it is stated that Q fever is an abbreviation of Queer fever; this is presumably a printer's error, but to prevent the possibility of fresh misunderstandings it may again be mentioned that Q in the name stands for Query which in this context means a mark of interrogation indicating that the aetiology of the disease was unknown, as indeed was the case when Derrick first described it. The formula Q = Query = ? may serve as a helpful reminder.]

In the same footnote it is stated that the name Q fever, which is international, ought to be retained, but the author goes on to state that it would be more in conformity with the rules of nomenclature to adopt the name coxiellosis because all the " rickettsiologists " agree that *Rickettsia burneti* should be classified as belonging to the genus *Coxiella* Philip, 1943. [The latter suggestion is not likely to be received with much enthusiasm; many of the leading workers on Q fever think it is premature to create a new genus till the question of the classification of the rickettsiaceae has become more settled, and even those who accept the name *Coxiella burneti* for the causative organism will not be ready to assume that no other species of *Coxiella*

will ever be discovered; if this happened the diseases caused by them would become rival claimants for the name coxiellosis.

An interesting observation by Gear [this *Bulletin*, 1955, v. 52, 261] may throw light on the supposed rarity of Q fever among the people of regions in which ticks infected with *R. burneti* are numerous. Gear found that there was a widespread immunity against the disease among the adult population of southern Africa and that non-immune newcomers were often attacked by the disease. There may be other parts of Africa in which few children escape infection so that attacks among adults will be rare.

John W. D. Megaw

Bertrand, L. & Roux, J. Isolement d'une souche de *Coxiella burneti* à l'occasion d'une rechute de fièvre Q humaine. [**The Isolation of a Strain of** *Coxiella* [*Rickettsia*] *burneti* **during a Relapse of an Attack of Q Fever**] *Ann. Inst. Pasteur.* 1955, July, v. 89, No. 1, 131–2.

The authors state that they know of only one previous occasion on which a strain of *Coxiella burneti* has been recovered from a patient in France. The present patient had been attacked by Q fever; the diagnosis was confirmed by the complement-fixation test and he had appeared to be cured by chloramphenicol, but a month later there was a relapse, on the first day of which 5 guineapigs, 5 mice, and 2 yolk sacs of embryo chicks were inoculated with the patient's blood. Four of the guineapigs developed febrile reactions on the 8th day and 2 of them died on the 13th and 14th days after inoculation; rickettsiae were seen in smears of their spleens. The other 2 guineapigs in which a reaction occurred gave positive reactions with the fixation test on the 25th and 35th days respectively. None of the mice died but rickettsiae were found in the peritoneal exudate and spleen smears of 2 of them which were sacrificed on the 10th day. No rickettsiae were found in the inoculated yolk sacs.

Ten guineapigs were inoculated intraperitoneally with spleen suspension of one of the infected guineapigs; 9 showed a febrile reaction and 4 of these died—3 between the 13th and 16th days and 1 on the 30th day.

The complement-fixation titres of the 8 guineapigs surviving on the 15th day were nil; 2 of the 6 survivors on the 25th day reacted at 1 in 16 and one at 1 in 32, respectively, and the 5 still alive on the 60th day reacted at titres ranging from 1 in 16 to 1 in 128.

The strain isolated was more nearly related to the Italian Henzerling strain than to the American Dyer strain which is lethal to 100 per cent. of the guineapigs inoculated.

John W. D. Megaw

Babudieri, B. & Moscovici, C. Infezione sperimentale da *Coxiella burnetii* (Philip) per via alimentare e per via transcongiuntivale. [**Experimental Infection with** *Coxiella burneti* **by the Oral and Conjunctival Routes**] *Rendiconti Istituto Superiore di Sanità.* Rome. 1955, v. 18, Pts. 1/2, 65–9. [12 refs.] English summary.

Q fever infection was produced in guineapigs by giving them large doses of virulent strains of *Rickettsia burneti* by the oral and conjunctival routes; 4 or 5 drops of a richly infected yolk-sac culture mixed with 50 cc. saline solution were given by the mouth, and 1–2 drops of the same mixture were instilled into the conjunctival sac.

With the "Nine mile" strain, 2 of 8 guineapigs infected by the oral route gave positive complement-fixation reactions at titres of more than 1 in

8 and 3 others reacted at 1 in 4 or 1 in 8; one of the positive reactions did not develop till 2 months after infection. Of 5 guineapigs infected by the conjunctival route 3 gave positive reactions.

With the Italian Grottazzolina strain all the 5 inoculations by the mouth caused positive reactions though one of them did not reach a titre of 1 in 8 till 20 days after inoculation, and the significant titre of 1 in 16 was not reached till 8 days later. Among the 5 guineapigs inoculated intraconjunctivally only 1 failed to react.

None of 6 pigeons infected orally gave a positive reaction though 7 of 8 control pigeons inoculated intraperitoneally gave positive reactions. In view of the large doses given it was concluded that infection by the above routes is not likely to be of much importance in natural conditions.

John W. D. Megaw

BARTONELLOSIS

Urteaga B., O. & Payne, E. H. **Treatment of the Acute Febrile Phase of Carrión's Disease with Chloramphenicol.** *Amer. J. Trop. Med. & Hyg.* 1955, May, v. 4, No. 3, 507–11.

In the advanced stages of Carrión's disease bartonellae move into the endothelial cells. *Salmonella* infection occurs commonly as a complication in Carrión's disease. Krumdieck (*An. Facul. de Med. Lima*, 1949, v. 32, 4) was the first to use chloramphenicol in treatment. In 1951 Payne and Urteaga [this *Bulletin*, 1952, v. 49, 40] treated 6 patients in the anaemic febrile phase with chloramphenicol by the mouth. To those who were comatose intravenous injections were given. Concurrently with normal temperatures the delirium and toxaemia subsided and none of the patients developed secondary *Salmonella* infection.

The present report concerns the use of chloramphenicol in an additional 19 patients in the anaemic febrile stage, ranging in age from 17 to 44, three of whom had concurrent *Salmonella* infections.

Before treatment there was a macrocytic anaemia with a red blood count which varied from 850,000 to 3,710,000 per cmm., with 40–100 per cent. of cells parasitized and marked hyperplasia of the bone-marrow.

An average total dose of 17·0 gm. chloramphenicol in 5 days in divided doses was administered to the 19 patients. After the first dose the patients' temperature returned to normal within 24 hours. Reticulocyte response was prompt. It was noted that the bacillary forms of bartonellae disappeared within 24 hours or were transformed to the coccoid form before vanishing.

Of the 3 infected with *Salmonella*, one who was moribund died. The others gradually recovered. Frequent sternal punctures were made on all patients and also on numerous persons taking chloramphenicol as a prophylactic. No deleterious effects on the bone-marrow were noted. (See also Cuadra, *Rev. Méd. Peruana*, 1954, v. 25, 253.) *Philip Manson-Bahr*

YELLOW FEVER

In this section abstracts are arranged as far as possible in the following order:—epidemiology, aetiology, transmission, pathology, diagnosis, clinical findings, treatment, control.

Cambournac, F. J. C., Gândara, A. F., Pena, A. J. & Teixeira, W. L. G. Inquérito sobre febre amarela em Angola. [**The Investigation of Yellow Fever in Angola**] *Anais Inst. Med. Trop.* Lisbon. 1955, Mar.–June, v. 12, Nos. 1/2, 101–20, 3 maps. English summary.

Yellow fever has been known in Angola at least since the epidemic of 1860–62, and since then various outbreaks have been reported. In 1934, 949 specimens of serum were collected, mostly from the north-west, and these were tested for protective antibodies at the laboratories of the West African Yellow Fever Commission, Lagos, where 11 were found to be positive [this *Bulletin*, 1935, v. 32, 282]. In 1952–53 the authors collected 1,549 specimens of serum of which 1,443 were from children under 15 years of age. These sera were collected from all provinces of the country, with the object of mapping out the geographical extent of the disease. Mouse-protection tests were carried out at the Virus Research Institute, Entebbe. Only 38 positive results were found, but these were from all provinces. It seems probable that the positive results from the north indicate naturally acquired yellow fever, but the few found in the south might have been the result of previous immunization. Many Africans speak of injections which may have been immunizations, but it was not possible to verify from the records the exact procedures in the individual cases. *Charles Wilcocks*

Taylor, R. M., Haseeb, M. A. & Work, T. H. **A Regional Reconnaissance on Yellow Fever in the Sudan: with special reference to Primate Hosts.** *Bull. World Health Organization.* Geneva. 1955, v. 12, No. 5, 711–25, 1 fig. [11 refs.]

Taylor *et al.* provide some additional information regarding suspected animal hosts of yellow fever virus in the Southern Sudan. In that area the mechanism responsible for the persistence of the virus seems to be different from that which is postulated for the African rain forests. The data presented were obtained during three expeditions, all of which were considered to be of a preliminary nature. Particular attention was paid to a survey of the primate population and to collecting blood specimens from them and from human beings. Only 4 species of primate were observed, namely *Papio* (baboon), *Cercopithecus aethiops* (grivet), *Erythrocebus patas* (red hussar) and *Galago senegalensis* (bush baby) and with the exception of galagos the other primates were not sufficiently numerous in most of the areas studied to account for the maintenance of yellow fever virus. Sera from 110 primates were tested in yellow fever neutralization tests. Of these 56 were from galagos of which only one was positive: of the remaining sera from 54 monkeys and baboons 39 were positive. (No positive galago sera were found in one area where 69 per cent. of sera from grivet monkeys were positive and the only positive galago serum was found in an area where 86 per cent. of grivet monkeys and 94 per cent. of baboons were positive.)

The neutralization tests on human sera showed that 8·5 per cent. of 386 sera from children under 15 years and 22·9 per cent. of 280 sera from adults were positive. These studies in conjunction with previous surveys indicate that yellow fever is rather highly endemic in the human population south

of the 10th parallel and west of the West Nile and that human infection is also occurring in the semi-arid plains west of the Nuba mountains as far north as El Muglad and is also occurring in the Nuba mountain area.

While it is clear that a cycle of yellow fever involves both man and monkeys the scarcity of the latter, particularly north of the Bahr el Arab river, makes it unlikely that they alone could be responsible for the persistence of virus. Since galagos do not seem to play a part in the cycle in Sudan, some other explanation must be adduced for the persistence of virus. The pattern of immunity among human beings is not like that of a simple man-to-man cycle of infection, and Taylor *et al.* consider that it is conceivable that in some areas of the Sudan a cycle of the virus might be maintained if man, monkeys and baboons served conjointly as hosts with a mosquito vector that attacks all three. The climatic conditions and habits and movements of the people in some of the areas studied make the hypothesis plausible. While this hypothesis fits the observed facts in some parts of the Sudan it may not apply to all parts. [The possibility of some other host has not yet been excluded. The abstracter has always considered that ticks have not been fully investigated as possible hosts and vectors of yellow fever virus. Failure to isolate virus by inoculation of ticks does not exclude them as possible hosts and vectors, for Colorado tick fever virus, for example, cannot be recovered from the eggs of infected ticks but can pass from these eggs to the larvae. Yellow fever virus in infected ticks might only be activated after a period of feeding.]

[Extensive reference is made to the literature on yellow fever in the Sudan, with which readers of this *Bulletin* will be familiar.]

G. W. A. Dick

See also p. 1150, Lewis, **The *Aëdes* Mosquitoes of the Sudan.**

See also p. 1149, Gillett, **Behaviour Differences in Two Strains of *Aëdes aegypti*.**

Gillett, J. D. **Further Studies on the Biting Behaviour of *Aëdes* (*Stegomyia*) *simpsoni* Theobald in Uganda.** *Ann. Trop. Med. & Parasit.* 1955, June, v. 49, No. 2, 154–7.

Previous studies by the author [this *Bulletin*, 1952, v. 49, 260] showed that *Aëdes simpsoni* at altitudes below 3,800 ft. in Uganda bites man readily and transmits yellow fever but that above this height it fails to feed on man. The mosquito was breeding quite plentifully in axils of banana plants and other plantation crops at both altitudes. In 7 further plantations studied at altitudes from 3,200 to 3,600 ft. the non-anthropophilic habit of *A. simpsoni* is confirmed, despite considerable breeding in the plantations. An altitude of 3,800 ft. is, therefore, not the critical height at which biting habit changes; the exact cause of the difference in habit is obscure. It is thought appropriate to speak of anthropophilic and non-anthropophilic races of *A. simpsoni*; no morphological differences are known.

Investigations are proposed in which the significance of the presence or absence of cattle in deviating the mosquito will be examined. Cattle are absent from Bwamba where man-biting habit is very marked, but they are present in some parts of Uganda where man is not a host to the mosquito. This selective habit of *A. simpsoni* in feeding may explain the absence of endemic yellow fever in some African communities living in conditions apparently as suitable as Bwamba for the transmission of the virus to man by this mosquito.

D. S. Bertram

Elton, N. W. **Anticipated Progress of Yellow Fever in Guatemala and Mexico, 1955–1959.** *Amer. J. Pub. Health.* 1955, July, v. 45, No. 7, 923–7, 1 map. [12 refs.]

In Mexico yellow fever was unusually active during 1920 on both the eastern and western coasts and epidemics occurred in the cities of Vera Cruz and Tampico, but since 1922 the disease has not been recorded in that country. There were outbreaks of yellow fever in Guatemala, El Salvador, Nicaragua, Honduras and British Honduras from 1918 to 1921 and again in El Salvador in 1924. From 1924 on, there was, however, no evidence of the disease in Central America until 1948 when, taking its origin in eastern Panama, a wave of jungle yellow fever began to move westward and northward, affecting successively Panama west of the Canal (1949–51), Costa Rica (1951–52), Nicaragua (1952–53) [this *Bulletin*, 1952, v. 49, 684; 1953, v. 50, 402] and then Honduras (1954) where, since the occurrence of 3 human cases in August–September 1954 [and up to the time the present article was written (March 1955)], the wave has continued to remain dormant in the north-west part of the territory. This "silent" phase—quiescence during the dry season or winter months—has been a fairly constant characteristic of the epidemiological pattern of the wave during its involvement of the Atlantic watershed of the countries successively affected.

Epidemiological observations seem to indicate that yellow fever in its epizootic form penetrated Honduras in 1953, following the line of the Guampu Valley, and extended along the coastal ranges of hills and foothills in a north-west direction. In March 1954 there was an outburst of monkey mortality at Piedras Amarillas, about 25 kilometres south-east of La Ceiba, in the vicinity of which two non-fatal human cases occurred in August of that year.

As to the further progress of the yellow fever virus in Central America and Mexico, the author, basing his opinion on the epidemiological pattern followed by the wave since its origin in 1948, predicts that the next epidemic outbreak may be expected in the vicinity of Los Amates, in the Motagua Valley of northern Guatemala, during the second half of 1955 and that within the succeeding 12-month period British Honduras, with involvement of the region around Belize, may well be affected. Thereafter, should conditions have remained favourable to its spread and no barrier zone to its progress been established, the virus may by 1959 pass through the State of Vera Cruz to Tampico, involving the Panuco Valley. In this event "the mountainous regions of the State of Tamaulipas to the north will probably contain the wave and provide the site of its death". *G. Stuart*

Trapido, H., Galindo, P. & Carpenter, S. J. **A Survey of Forest Mosquitoes in relation to Sylvan Yellow Fever in the Panama Isthmian Area.** *Amer. J. Trop. Med. & Hyg.* 1955, May, v. 4, No. 3, 525–42, 2 figs. [11 refs.]

After the extermination of yellow fever of the urban type from the Panama Canal zone in the first years of this century the disease was not recognized clinically anywhere in the Republic of Panama until 1948. There was, however, evidence of natural immunity, even in children, in the part of the Republic lying east of the canal, that is to say adjacent to South America. The facts might be interpreted by saying that jungle yellow fever was present in that area (which is remote and difficult of access) but not west of the canal, *i.e.*, in the direction of Central America. The matter was brought into focus by the occurrence of deaths from yellow fever, of the jungle type,

east of the Canal Zone in 1948 and afterwards westwards along the Atlantic but not the Pacific side of the Republic, and still later in Costa Rica. It is to be understood that the Atlantic side of the area receives a much higher rainfall and for a greater part of the year than the Pacific side.

The authors [see below: see also this *Bulletin*, 1951, v. 48, 144] have already reported on a large number of mosquitoes collected on platforms and the ground. They here report further on rather similar collections made widely in Panama and for the most part during the rainy season. They find it sufficient to make simultaneous collections in the canopy and on the ground, omitting any platform mid-way up a tree. The collections are made for the six hours from 9 a.m. to 3 p.m. only. The localities are shown on a map.

Seventy-two species of mosquitoes were captured and identified from some 72,000 specimens in all. The number of captures per hour was considerably greater at ground level than in the canopy. In the analysis a considerable amount of attention is given to mosquitoes of the genus *Haemagogus* of which the most widely distributed and commonest was *H. equinus*. As to *H. spegazzinii falco*, which has a particular interest as the proved vector of sylvan yellow fever in Colombia, the authors record that it was not common, forming 6·3 per cent. of all specimens of the genus. The detailed distribution of this insect is dealt with at some length. The authors also collected 13 species of *Aëdes* appertaining to three sub-genera. *Aëdes leucocelaenus clarki*, a known vector of yellow fever, was not very abundant but was captured at a number of stations. The numbers appeared to be so low in one or two places on the Pacific side of Panama that the authors feel that in that area it could hardly be an effective vector. As one would expect, members of the genus *Wyeomyia* made up a large proportion, indeed almost one-third, of all the mosquitoes taken.

An interesting diagram is provided showing the vertical distribution of the mosquitoes as judged by captures during the day time. At one end of the diagram is *Wyeomyia arborea*, all specimens of which were captured in the canopy, at the other end *Anopheles punctimacula* and one or two other mosquitoes which are invariably captured on the ground: indeed one may say that members of the genus *Anopheles* in general were almost entirely on the ground, with the exception of *A.* (*Kerteszia*) *neivai* which breeds in epiphytes in the tree tops and was frequently taken there.

In discussing their results the authors point out that these collections of forest mosquitoes do not give a simple explanation of the long-continued absence of sylvan yellow fever from the area west of the canal prior to 1950. The two major vectors in South America named above are both found in Western Panama, also in Costa Rica, as are other mosquitoes which might be suspected on epidemiological grounds. It is, however, significant that the probable vectors and many other mosquitoes are much more abundant on the Atlantic aspect than on the Pacific and it was along the Atlantic side that human fatalities and monkey fatalities too were recorded within recent years [see Elton, *ibid.*, 1953, v. 50, (24)]. *P. A. Buxton*

Galindo, P. & Trapido, H. **Forest Canopy Mosquitoes associated with the Appearance of Sylvan Yellow Fever in Costa Rica, 1951.** *Amer. J. Trop. Med. & Hyg.* 1955, May, v. 4, No. 3, 543–9, 3 figs.

The authors continue their valuable series of papers and discuss mosquitoes captured in forest in an area on the Atlantic coast of Costa Rica in which jungle yellow fever occurred in man and monkeys. The paper deals with the

mosquitoes captured in two localities in August and September. In both localities *Haemagogus spegazzinii falco* was relatively abundant. It was noted with surprise that this insect was attacking man on the ground in a cacao plantation partly shaded by large trees. In the experience of the authors the species is generally limited to the canopy of primary rain forest. They suggest that this insect and others characteristic of the canopy in unbroken forest may come down to ground level commonly enough when small clearings are made, so that under those circumstances there may be a dangerous contact between the cultivator and the tree-top mosquitoes. *Sabethes chloropterus* was also common, a species which has been suspected on epidemiological grounds of being concerned with the transmission of a yellow fever virus. The collecting stations were remote and it was generally impossible to get mosquitoes alive to the Gorgas Institute in Panama. Attempts to recover virus from batches of mosquitoes were not successful.

P. A. Buxton

DENGUE AND ALLIED FEVERS

Guelmino, D. J. & Jevtić, M. **An Epidemiological and Hematological Study of Sandfly Fever in Serbia.** [Miscellanea.] *Acta Tropica.* Basle. 1955, v. 12, No. 2, 179–82.

Sandfly fever had been unknown in Serbia till it broke out in epidemic form in 1946; since then it has occurred every year in epidemics of varying intensity. In the northern part of the country, where it first occurred in 1948, about three-fourths of the population of 1,200,000 were attacked. Infection was imported from the south, especially from Macedonia where the disease was endemic. A succession of 4 dry and hot years favoured the prevalence of sandflies in Serbia.

At first there were local foci of infection in which the disease gave the impression of being spread by contact but soon the infection spread from these foci all over the surrounding regions. The season of incidence was from the middle of June to the middle of September; this period was also the season of greatest prevalence of sandflies.

In heavily affected areas many of the patients were attacked twice or even three times in the same year. These repeated attacks were associated with a high rate of prevalence of sandflies and were unusual in Belgrade where the average number of sandflies in each room was small; the recurring attacks were, therefore, attributed to reinfection rather than to a tendency to relapse.

Among 500 sandflies examined, 85 per cent. were *Phlebotomus papatasi*; 13 per cent. were *P. perfiliewi* and 2 per cent. were *P. major*.

Except for apparent immunity of infants, all age-groups were equally affected, but although the youngest patient was 4 years old it was believed that mild and symptomless attacks may have occurred in younger children. The symptoms were of the usual kind. The typical blood picture was one of leucopenia; the average total leucocyte count was 4,300 per cmm., and the lymphocytes were 44·1 per cent. of the total. *John W. D. Mcgaw*

RABIES

Smith, C. E. G. & Wells, C. W. **Rabies in Malaya.** *Bull. Inst. Med. Res. Fed. Malaya.* 1955, n.s. No. 8, 1–26. [30 refs.]

The object of this publication is to provide doctors and veterinary officers with a short, readily accessible account of present-day knowledge of rabies. The subject is admirably dealt with in a clear, concise and highly informative manner and the authors are to be congratulated on producing so very useful and practical a paper—a paper of particular value to its readers in Malaya.

The paper opens with a brief statement on the rabies situation in Malaya, where the dog is the principal, if not the sole, vector of the disease and where, thanks to compulsory mass vaccination of dogs, stringent legislation and intensive stray-dog destruction, it was found possible to declare the whole territory free from the disease in April 1954. The aetiology, pathology and clinical course of rabies in man and in animals are then given in separate sections of the paper. The section concerned with rabies in man also prescribes the local and specific post-exposure treatment to be followed, discusses the reactions which may complicate the use of brain-tissue vaccines such as the phenolized sheep-brain Semple-type vaccine employed in Malaya, and indicates the treatment recommended for local and systemic reactions, as well as that for neuroparalytic accidents. The section concerned with rabies in animals also specifies the control measures considered to be necessary for successfully combating any future outbreak of canine rabies in Malaya and for keeping the territory free from infection. These measures postulate: the compulsory vaccination of dogs (with chicken-embryo vaccine prepared from the Flury strain) within a distance of at least 30 miles of the place of outbreak; the unremitting destruction of unvaccinated dogs; the enforcement of legislation to control the movement of dogs within the territory and their entry into it; and propaganda calculated to create and maintain public interest in the vaccination of dogs.

The 8 appendices to the paper comprise: information on the techniques to be employed in the preparation of animal tissues for laboratory diagnosis; indications for the specific post-exposure treatment of man; data on the immunization of dogs with chicken-embryo-adapted vaccine; the principal items of veterinary legislation in Malaya concerning rabies; and notes on the capture and destruction of stray dogs.

[It is of interest to observe that in Malaya, where between 1946 and 1951 the average number of cases of canine rabies confirmed by laboratory investigation was 112 per year and where in 1952 the number of such cases reached 198, the total of recorded human deaths from rabies between 1946 and 1952 inclusive was only 25.] *G. Stuart*

Grimes, J. E., Eads, R. B. & Irons, J. V. **An Additional Species of Insectivorous Bat naturally infected with Rabies.** *Amer. J. Trop. Med. & Hyg.* 1955, May, v. 4, No. 3, 554–6, 2 pls.

Accounts published in 1954 recorded the recovery of rabies virus from four different species of insectivorous bats caught in the United States. The species mentioned in these accounts and the States in which capture of the naturally infected bats took place were: *Dasypterus floridanus* (Florida yellow bat) in Florida, *Lasiurus seminolus* (Seminole bat) in Florida, *L. cinereus* (hoary bat) in Pennsylvania—all 3 species of solitary bats—and *Tadarida mexicana* (Mexican free-tailed bat), a colonial, cave-frequenting species [this *Bulletin*, 1954, v. 51, 1240].

The purpose of the present paper is to report the recovery of rabies virus from still another species of North American colonial, insectivorous bat, *Chilonycteris personata*. The two bats from which the isolation of virus was made had been collected from a cave in the State of Vera Cruz, Mexico, which was also inhabited by vampire bats.

As rabies infection, once introduced, may spread considerably among different species living together in the same cave and frequently fighting with each other, inter-species transmission such as this might well account for the infection of, for example, the Mexican free-tailed bat, *T. mexicana*, referred to above as having been taken in Texas; many of these bats winter in Mexico, within the range of the vampire bat.

[The fact that fruit- and insect-eating species of bats become infected and infectious, makes transmission of rabies to man by non-haematophagous bats a possibility; in this connexion it may be mentioned that the biting of human beings by rabies-infected bats of these species has been observed recently in the U.S.A.—in Florida and in Pennsylvania.] *G. Stuart*

Enright, J. B., Sadler, W. W., Moulton, J. E. & Constantine, D. **Isolation of Rabies Virus from an Insectivorous Bat** (*Tadarida mexicana*) **in California.** *Proc. Soc. Exper. Biol. & Med.* 1955, May, v. 89, No. 1, 94–6.

This paper records the isolation of rabies virus from a Mexican free-tailed bat (*Tadarida mexicana*) collected on 20th July 1954 in northern California. From the pooled brain and submaxillary gland tissues of this bat, which was well nourished and normal in appearance when trapped, a 10 per cent. suspension in physiological saline solution was prepared. Isolation of the virus was effected by the intracerebral inoculation of Swiss mice and proof of its identity was established by serum neutralization tests. Numerous well-formed and characteristic Negri bodies were present in the brains of first passage mice; brain sections stained with haematoxylin and eosin showed evidence of inclusions and of encephalitis. Intracranial inoculation of two different species of bats, Mexican freetails (*Tadarida mexicana*) and pallids (*Antrozous pallidus*), with 0·03 ml. of the original pooled brain and salivary gland tissues was followed in 15 or 16 days by symptoms of rabies; in the freetails the disease was of the furious type, in the pallids it was of the paralytic type.

From information now available it emerges that in the United States there are five geographical areas in which bats have been found to harbour rabies virus, namely, California, Florida, Montana, Pennsylvania and Texas. This strongly suggests that the rabies virus is very widely disseminated among the insectivorous bats of the United States. The migratory habits of certain of these bats bring them into contact in Mexico with the vampire bat (*Desmodus*), which is not only a vector of rabies but also a virus carrier, capable of harbouring the virus for many months. Insectivorous bats may thus become infected, but " what role this recently-recognized host plays in the transmission of the virus to new susceptibles or in enabling the virus to survive in nature remains to be investigated ". *G. Stuart*

Nehaul, B. B. G. **Rabies transmitted by Bats in British Guiana.** *Amer. J. Trop. Med. & Hyg.* 1955, May, v. 4, No. 3, 550–53.

Although since 1908 epizootics of " paralytic rabies "—a paralytic form of rabies transmitted by haematophagous bats—have frequently occurred among

cattle in Brazil and in Venezuela, human cases of this type had not previously been reported in South America. The present paper gives an account of an outbreak of this bat-transmitted paralytic rabies in the Mazaruni District of British Guiana during the months of August and September 1953, when 9 persons died from the disease. The outbreak occurred among miners living in a forest area near a river bank, in camps or in huts, under conditions which made them particularly vulnerable to attack by vampire bats. The duration of illness from onset of symptoms to time of death varied between 2 and 12 days. Six of the affected miners who were admitted to hospital presented the clinical features of an acute ascending myelitis; smears from the brains of five, on whom post-mortem examination was carried out, showed Negri bodies. Paralytic rabies had been diagnosed in cattle some time before the occurrence of the cases now reported.

Why so few human cases of acute paralytic rabies have been observed, outside of Trinidad, in areas where the vector abounds and the presence of rabies virus has been demonstrated in infected animals is a matter for conjecture. Is the reason the one put forward by Málaga-Alba [this *Bulletin*, 1954, v. 51, (1057)], who believes that human beings are only slightly susceptible to the disease? *G. Stuart*

Jelesic, Z. & Atanasiu, P. Sur les paralysies des souris immunisées dans le test de protection des différents vaccins antirabiques. [**On the Paralyses of Immunized Mice in the Protection Test with Different Antirabies Vaccines**] *Ann. Inst. Pasteur.* 1955, June, v. 88, No. 6, 786–9. [13 refs.]

This paper compares the protective values of four different inactivated antirabies vaccines as determined by the Habel test, indicates the occurrence or otherwise of challenge virus in the brains of those mice which developed paralysis, and describes the histopathological changes observed in these animals. Of the vaccines tested two were of high immunizing power, one was of sufficient, but of minimal acceptable, potency, and one was of low antigenic value.

Mice which did not survive challenge (with standard challenge fixed virus) showed the paralyses and quadriplegias, as well as the histopathological changes, characteristic of fixed-virus rabies. Whereas, however, intracerebral passage of brain substance from paralysed mice which had received vaccines of high antigenic potency to new groups of mice invariably failed to reveal the presence of rabies virus in the brains of the latter animals, similar passages with brain substance from mice which had received vaccines of low, or of just acceptable, potency were uniformly successful in transferring the virus and the disease.

Fatal paralyses, with the histopathological lesions of fixed-virus rabies, occurred therefore in mice challenged after protective treatment, whether by potent vaccines or by vaccines of low antigenic power. In the case of the potent vaccines, however, the lesions are ascribed by the authors to an excessive local reaction produced by the virus which disappears—a condition paralleled in the self-sterilizing neuro-infections which, with respect to rabies, have been reported both in vaccinated and in non-vaccinated animals. In the case of the less potent vaccines the lesions are also caused by the virus, but in this instance the virus persists.

Whether a differentiation between these two kinds of paralyses is possible, with an improvement in the Habel test brought about by excluding from the

cumulative totals used in determining the 50 per cent. endpoints, the deaths with self-sterilization of the virus, is a question still to be answered.

G. Stuart

Relova, R. N. **The Efficacy of our Alabang Anti-Rabies Vaccine over Local Street Virus.** *J. Philippine Med. Ass.* 1955, Mar., v. 31, No. 3, 109–12.

See this *Bulletin*, 1948, v. 45, 746.

PLAGUE

In this section abstracts are arranged as far as possible in the following order:—epidemiology, aetiology, rodent hosts, transmission, pathology, diagnosis, clinical findings, treatment, control.

Worsfold, J. T. **An Outbreak of Plague at Chitokoloki, Balovale.** *Central African J. of Med.* 1955, May, v. 1, No. 3, 116–17, 1 fig.

A small outbreak of sylvatic plague is described; it occurred in an area in which plague was last seen in 1937. There were 9 cases, of which 5 were fatal. Two of them were acutely septicaemic in type, the others were bubonic. All the patients lived in or near a village consisting of 7 mud huts about a mile from a Mission Station of Chitokoloki, which is situated on the Zambesi river about 500 miles west of the Copper belt. The walls of the huts were honeycombed with rat burrows but no dead rats were seen; it was believed that infection had been introduced by multimammate mice which swarm in the area.

Bacilli resembling *Pasteurella pestis* were found in small numbers in stained smears of gland-puncture fluid from a patient and in large numbers from smears made from the consolidated patches of the lung of another patient after death. Two wild rats died 6 days after inoculation with gland-puncture material from the former patient. Unfortunately it was not possible to obtain cultures of the organism. *John W. D. Megaw*

Ogata, N. Wer hat die Pestbazillen zuerst entdeckt? Kitasato? Yersin? Oder Kitasato und Yersin? [**Who was the First to discover the Plague Bacillus? Kitasato? or Yersin? or Kitasato and Yersin?**] *Zent. f. Bakt.* I. Abt. Orig. 1955, v. 163, Nos. 2/3, 171–2.

The author tells how Kitasato and Yersin, while engaged separately in Hong Kong on an investigation into an epidemic of plague in 1894, each discovered and isolated a strain of bacillus which he described as the cause of the disease. The two strains were at first regarded as being identical, but 2 years later, during an epidemic of plague in Formosa, a Japanese military medical officer, Nakamura, who had read the published descriptions of the strains noticed that they differed from each other in certain respects and was doubtful whether the bacillus which he had isolated in the course of his own investigations was the one described by Kitasato or the one described by Yersin. M. Ogata, father of the present author, was sent to study the problem; he found that the Yersin bacillus was the real cause of plague and that Kitasato's bacillus was a secondary organism which was

motile and Gram-positive, whereas Yersin's bacillus was non-motile and Gram-negative. Ogata reported this finding to the Moscow International Medical Congress in 1896, and at the same time brought forward the theory of transmission of the infection by the flea. In 1899 Kitasato, while engaged with other workers in a study of an outbreak of plague in Kobe, was the first to acknowledge that the Yersin bacillus was the real cause of plague.

[Although these facts are well known to most bacteriologists it is surprising to find how often the bacillus is referred to as the bacillus of Kitasato or of Kitasato and Yersin.] *John W. D. Megaw*

Girard, G. Les trois variétés du bacille pesteux (*Pasteurella pestis*). Intérêt épidémiologique de cette notion. [**The Three Varieties of** *Pasteurella pestis*. **Their Epidemiological Significance**] *Maroc. Méd.* 1954, Nov., v. 33, No. 354, 1016–18.

The author discusses the epidemiological significance of the classification of *Pasteurella pestis* proposed by Devignat in 1951 [this *Bulletin*, 1952, v. 49, 45]. This was as shown in the table below:

	Glycerin fermentation	Nitrous acid production
P. pestis orientalis	No	Yes
P. pestis antiqua	Yes	Yes
P. pestis mediaevalis	Yes	No

Apart from the above differences in their biochemical properties the three varieties have not been shown to differ in their morphological, cultural or antigenic properties. From the physician's point of view their differentiation is of no practical importance. On the other hand when infection either among rats or wild rodents is found to be caused by the *orientalis* variety, which does not ferment glycerin, it can safely be assumed that the original source of infection has been the rat, whereas if one of the other two varieties is concerned it can be assumed that the source has been a recrudescence of an ancient focus of infection among wild rodents of the locality. The glycerin-fermenting and non-fermenting varieties have never been found to lose their distinctive characteristics by prolonged storage, by repeated subcultures, or by passage through animals, and in each fresh outbreak of plague only one variety can be isolated. Only in rare cases have ancient foci of a glycerin-fermenting strain been found in juxtaposition with a recently introduced *orientalis* strain.

North Africa, especially Morocco, where for at least 150 years there have been repeated epidemics of plague, is suggested as a suitable field for further investigation of the problem. *John W. D. Megaw*

Hentsch, H. F. G. Zusätzliche Massnahmen in der Pestbekämpfung. [**Accessory Measures in the Prevention of Plague**] *Zent. f. Bakt.* I. Abt. Orig. 1955, v. 163, Nos. 2/3, 173–6.

The chief accessory method of plague prevention described is the digging of a trench all round each house in villages (in Java) threatened with the disease. It is stated that rats in the infective stage of the disease are not able to cross a trench 45 cm. deep and 40 cm. wide, provided that the

walls are vertical. It is admitted that constant care is needed to keep the trenches in good order, especially during the rainy season. No account seems to have been taken of the likelihood of the entry of rats during the early incubation period of the disease.

Experiments are described in which it was found that some rat fleas survived after 20 minutes' contact with a 2·0 per cent. solution of DDT. It was also found that the plague bacillus could survive for at least 15 days in the bodies of infected fleas which had been killed by DDT provided that the insects were not desiccated. Such fleas are regarded as potential sources of infection to persons walking barefoot and especially to children playing on the infested ground. *John W. D. Megaw*

AMOEBIASIS AND INTESTINAL PROTOZOAL INFECTIONS

In this section abstracts are arranged as far as possible in the following order:—epidemiology, aetiology, pathology, diagnosis, clinical findings, treatment, control.

Wykoff, D. E., Fonseca, J. R. C. & Ritchie, L. S. **Epidemiology of Amebiasis: Possible Influence of Water Supply, Coincident with Diverse Features of Terrain, on the Occurrence of Intestinal Protozoa.** *Amer. J. Trop. Med. & Hyg.* 1955, May, v. 4, No. 3, 465–71, 1 fig. [10 refs.]

It has been suggested as the result of observations made in Japan that different sources of drinking water may account for differences in the endemic incidence of intestinal protozoal infection [this *Bulletin*, 1952, v. 49, 523]. Communities on level terrain with open wells as a source of water had fewer protozoal infections than mountain villages which used water from streams. The present paper records the results of an extensive survey of villages in the broad Kofu valley in Japan and compares these findings with those obtained for villages at different levels in several narrow valleys in the mountains. Some geographical particulars and a map are included. Protozoal incidence data were obtained by single stool examinations, with the formalin-ether procedure, of 1,265 persons living in hill communities and 1,989 persons living on the flat areas of the primary valley. In the hills where water from streams is used the percentage incidence of *Entamoeba histolytica* was 14·8 whereas in the flat areas with well-water as the main source of supply the incidence of infection was 5·4 per cent. In the hills the incidence tended to increase from upper to lower levels. It was found that fluctuations in the incidence of *Entamoeba coli* and of *Endolimax nana* were irrespective of valley levels. These findings are discussed as well as the possible factors of spread by food or flies but it is believed that water was the major factor of difference.

M. E. Delafield

Norman, Lois & Brooke, M. M. **The Use of Penicillin and Streptomycin in the Routine Cultivation of Amebae from Fecal Specimens.** *Amer. J. Trop. Med. & Hyg.* 1955, May, v. 4, No. 3, 472–8. [23 refs.]

Certain antibiotics, on account of their relative lack of activity against intestinal protozoa, have been used in the culture of these organisms in order to prevent overgrowth by bacteria [this *Bulletin*, 1950, v. 47, 538;

1952, v. 49, 150]. In the present report the results obtained in culture of amoebae of various species from 412 faecal specimens in the presence of small amounts of penicillin with streptomycin and in the absence of these substances are recorded. Other methods of diagnosis were also used and the results are compared. Egg slants overlaid with buffered Locke solution without serum, plus rice powder, were used for cultivation in the presence of a final concentration of 250 units of penicillin and streptomycin in the overlay. It was realized that this may not have been the optimum concentration. Inoculation of a similar medium in the absence of antibiotics was also carried out. Examination of the sediment in each tube was made after 24 hours' incubation at 37°C. and again 48 hours later on cultivation in medium free from antibiotics. It appeared that the addition of the combination of antibiotics improved the results in cultivation experiments.

Culture techniques, including permanent staining of sediment films, were not always as efficient as others commonly used in diagnosing the presence of amoebae and their value depended to a considerable extent on the age of the specimens, more positives being obtained with fresh specimens. Diagnosis was greatly aided by the use of concentration techniques for cysts. *J. D. Fulton*

Soulage, J., Caubet, P. & Miletto, G. Le pneumopéritoine procédé d'exploration complémentaire dans l'amibiase hépatique. [**Pneumoperitoneum in the Exploration of Hepatic Amoebiasis**] *Méd. Trop.* Marseilles. 1954, July–Aug., v. 14, No. 4, 393–400, 6 figs. on folding pl. [13 refs.]

Collapse therapy by pneumoperitoneum in the treatment of pulmonary tuberculosis has suggested to the authors the advantages of this method in the diagnosis of certain affections located above or below the diaphragm. The contours of solid organs stand out clearly against the clear gaseous background, so that liver and spleen are as sharply defined as are the hollow viscera when examined by means of a barium meal. The air collects in the highest regions and by changing the position of the patient various profiles of the liver and spleen can be obtained; in the case of lesions above the diaphragm the gaseous crescent isolates the ptosed liver, permitting a clear view of lesions of the base of the right lung and facilitating differentiation between hepatic amoebiasis with involvement of the right lung base and pleurisy with effusion. Mediastinal lesions are clearly seen.

It is more especially in the diagnosis of sub-diaphragmatic lesions that the method is of great value. In diaphragmatic hernia the gas penetrates into the sac and shows it up clearly, thus differentiating it from pleuro-pericardial cysts; other intraperitoneal hernias containing omentum are shown up when a barium meal would fail to do so and any tumour or cyst of the liver, breaking the upper convexity, is clearly seen. This procedure is most useful in the diagnosis of hydatid cysts and in hepatic amoebiasis which is commonly accompanied by a variable amount of pleuro-parenchymatous inflammation of the base of the right lung, especially when the liver changes are near the convexity, leading to adhesions to the diaphragm, purulent pleurisy and ultimately to a hepato-bronchial fistula. The examination should not be carried out during the acute febrile stage, for fear of rupturing the fine adhesions and infecting the peritoneum, nor should it be used when the diagnosis can be made by ordinary clinical methods; it should be reserved for cases where it is necessary to find out whether radio-opaque shadows at the

right base are secondary to hepatic amoebiasis or not, and in the case of permanent deformations of the diaphragmatic cupola to ascertain their cause.

The authors have never had occasion to employ pneumoperitoneum in the diagnosis of abscess of the lung of amoebic origin, but they consider that the fusion of liver and diaphragm, revealed by the examination, would be in favour of a diagnosis of amoebiasis, if amoebae were not found in the pus.

The dangers of the method are gas embolism, insufflation of the colon, or pneumothorax from rupture of the diaphragm. After the examination pain may be caused, when the patient stands up for screening, by traction on the hepato-diaphragmatic adhesions.

Case histories of 6 cases are given, in all of which a doubtful diagnosis was cleared up by this method of examination, accompanied by 6 very clear reproductions of radiographs illustrating the findings. *W. L. Harnett*

Davies, J. A. L. **The Diagnosis of Amoebic Colitis.** *Proc. Roy. Soc. Med.* 1955, July, v. 48, No. 7, 491–6 (Sect. Proctology 13–18), 8 figs.

At the West London Hospital localized radiological changes in the colon, chiefly in the caecum and ascending colon, have been demonstrated by barium enemata in proven cases of amoebiasis. Furthermore, where a specific diagnosis has not been established barium enemata have shown localized changes in other cases similar in appearance and site to these. In both groups treatment with amoebicidal drugs has resulted in improvement, or restoration to normal, of the bowel appearance. Details of 4 " typical " cases are appended, together with reproductions of the X-ray photographs of them.

The first patient had served in Egypt some years earlier and had had occasional diarrhoea there. He was admitted with a suspected carcinoma of the caecum or ascending colon, and X-ray studies showed irregularity and a mass in the mid-part of the ascending colon. This mass vanished spontaneously, but X-ray shagginess in outline remained some months later; cysts of *Entamoeba histolytica* were then found in the stools, after earlier fruitless searches for them. Treatment with emetine bismuth iodide [EBI] and chiniofon for 10 days caused the parasites to vanish; the caecum and colon were restored to normal and have remained so 18 months later.

The second patient also had served in Egypt where he had had an alleged attack of amoebic dysentery. Stool examinations revealed no parasites, but X-ray study showed a shaggy outline of the caecum and ascending colon; so a tentative diagnosis of amoebic dysentery was made. *E. histolytica* cysts soon thereafter were found in the stools; after a short treatment with Milibis and oxytetracycline the patient was restored to normality.

The third patient, a woman, had been in India where she had had an attack of diarrhoea. Repeated stool examinations failed to reveal parasites " despite a provocative injection of emetine " and a saline purge. As there was similar shagginess of the caecum one week's treatment with Milibis was given; this resolved the condition, though there was a persistent cone-shaped deformity of the caecal wall.

The fourth patient had served in North Africa, where he had suffered some nausea, diarrhoea and stomach-ache with fever. No parasites were found on repeated examination of his stools " despite provocative emetine and purgation "; here again a barium enema showed shaggy irregularity of the caecum, and in this case in the sigmoid colon. This patient also was treated with Milibis and oxytetracycline for one week with the anticipated improvement.

In these 4 cases of amoebic colitis there were symptoms referable to the

gastro-intestinal tract, but the physical signs were not marked except in the first case. The standard textbooks fail to mention distinguishing features in the radiological appearance of amoebic and of non-amoebic colitis, but the author now lists them: the most important is shagginess of localized areas of the large bowel. In his opinion the diagnosis of amoebic colitis is often missed " by undue reliance on the classical stool and sigmoidoscopic findings ". Cases of localized colitis, detected by the radiological changes he mentions, " should under no circumstances be regarded as having a non-specific aetiology until the effect of anti-amoebic drugs has been tried ".

[This paper completely fails to carry conviction, of the nature intended, to the abstracter.] *A. R. D. Adams*

Gambardella, A. Rilievi clinici sul trattamento della colite amebica con dijodo-idrossichinolina. [**Clinical Observations on the Treatment of Amoebic Colitis with Di-iodohydroxyquinoline**] *Acta Med. Italica.* 1954, Nov., v. 9, No. 11, 291–4. [18 refs.] English summary (6 lines).

Gambardella has treated 20 patients with tablets of " Jodoentero "—which has the following formula:— Jodochin 150 mgm., phthalylsulphathiazole 300 mgm., vitamin PP 25 mgm., vitamin B2 2 mgm., to each tablet of 0·80 gm. The preparation was from the Italian Biochemical Institute. [Jodochin is presumably di-iodohydroxyquinoline.]

Fifteen of the patients had amoebiasis going back 1–9 years and had all received treatment with emetine from time to time. Seven had both cystic and vegetative forms of *E. histolytica* in their stools, and cysts only were found in the other 8: cysts of *Giardia* were also shown in the stools of 4 patients. Because of chronicity and long duration of the infection in 4 of the cases, the author first gave these a course of emetine before prescribing Jodoentero. Treatment with the latter preparation [4–8 tablets a day for 15–20 days] rid all the 15 patients of their amoebae, though 2, one of whom had a duodenal ulcer, continued to complain of their symptoms.

The 5 other patients had a more recent amoebic infection dating from 1 to 8 months, and they all had both cystic and vegetative forms of the parasite in their faeces; 3 were cured by 6 tablets taken daily for a fortnight. Another patient was rid of his amoebae but his remission from symptoms was only temporary. The other patient was made worse by Jodoentero but obtained much benefit from a subsequent course of emetine.

Gambardella noticed no evidence of intolerance to Jodoentero and thinks that this preparation might be used for the routine treatment of amoebic colitis. *J. Cauchi*

Chaudhuri, R. N., Chatterjee, A., Mukherjee, A. M., Ray, H. N., Sen, G. N. & Werner, G. **Clinical Observations with New Amoebicidal Drugs.** *Indian Med. Gaz.* 1954, Sept., v. 89, No. 9, 530–33. [10 refs.]

Continuing their enquiry into these matters [this *Bulletin*, 1954, v. 51, 924] the authors have treated random samples of patients suffering from parasitically proven amoebiasis with Viasept (the bismuth salt of *p*-glycolyl-aminophenylarsonic acid), with Neoviasept (a combination of chloroquine with the former drug), or with Nivembin (5, 7-di-iodo-8-hydroxyquinoline and chloroquine). The methods of diagnosis and the determination of response were those mentioned in their earlier paper. Viasept was given orally in doses of 0·5 gm. thrice daily for 8 days to 27 patients; the results were disappointing in that 9 patients were not cured clinically or parasitically

by the treatment. Neoviasept, which contains Viasept with 0·15 gm. of chloroquine [? base] in each tablet, was similarly given to 37 patients; though the results as a whole were rather better they were not satisfactory in those patients passing more than 6 stools a day.

Nivembin tablets, each containing 0·3 gm. of the di-iodohydroxyquinoline and 65 mgm. of chloroquine sulphate, were given in doses of 2 tablets thrice daily for 3–4 days, and then 1 tablet thrice daily for 8–10 days to 28 patients; the clinical and parasitic response in all but one of these cases was satisfactory; all but this one seemed to be " cured ". *A. R. D. Adams*

Khan, N. **Terramycin in Chronic Amoebic Dysentery.** *Indian Med. Gaz.* 1954, Sept., v. 89, No. 9, 525–30.

Ten patients with chronic amoebic dysentery, diagnosed by stool and sigmoidoscopic examinations, were treated with oxytetracycline (Terramycin) given orally in the usual dosage for a week to 10 days. The history and treatment of each are detailed in the text, and the results are summarized in a table. Symptoms ceased, parasites vanished from the stools, and ulcers disappeared from the lower bowel in each case during the treatment. Nine of the 10 patients observed for 1 to 2 years have remained well.

A. R. D. Adams

Neal, R. A. & Vincent, Patricia. **Strain Variation in** *Entamoeba histolytica*. **I. Correlation of Invasiveness in Rats with the Clinical History and Treatment of the Experimental Infections.** *Parasitology.* 1955, May, v. 45, Nos. 1/2, 152–62. [33 refs.]

In a previous paper [this *Bulletin*, 1951, v. 48, 640] it was shown that strains of *Entamoeba histolytica* isolated from acute cases of human amoebiasis produced ulceration in the caecum of rats, whereas those from symptomless carriers did not invade the wall. In the present investigation the virulence or invasiveness of a larger number of strains, and their response to treatment with emetine, were studied. The material comprised 11 strains from contact carriers and 3 from clinical cases, cultures of which were injected intracaecally into rats, which were killed 7 days later and examined for the presence of amoebae and ulceration of the intestinal wall. For the detection of microscopical lesions, caeca of infected rats were fixed and sectioned.

While all the strains proved to be infective to rats, those from the 11 symptomless carriers failed to invade their caecal wall, whereas those from clinical cases produced ulceration. Most of the rat infections with non-invasive strains were successfully cured with 6 daily oral doses of 2 mgm./kgm. emetine hydrochloride, but in 2 animals infected with invasive strains the amoebae were not fully eliminated by 4 mgm./kgm. of the drug. Examination of sections of heavily infected caeca, which did not show any ulceration macroscopically, likewise revealed no microscopical lesions, while the food vacuoles of the amoebae contained only bacteria and yeasts. This work has therefore demonstrated that there is " a good correlation between the presence or degree of invasiveness of *E. histolytica* in the rat with the type of amoebiasis in the human host ". These results are in contrast to those obtained by some authors who used kittens as experimental animals and came to the conclusion that *E. histolytica* was invariably virulent. In analysing these works, the present authors attribute the reactions of kittens to their exceptional susceptibility to amoebic infection.

C. A. Hoare

Beck, J. W., Stanton, R. L. & Langford, G. C., Jr. **Human Infection with *Isospora belli*. Report of a Case in Florida.** *Amer. J. Clin. Path.* 1955, June, v. 25, No. 6, 648–51, 2 figs.

"Infection with *Isospora belli* in a 17-month-old Negro girl is the first reported case of coccidiosis occurring in Florida. Of 28 cases reported in the United States only 4, including the present case, had a definite history of lifetime residence in the United States. The patient had concomitant giardiasis, general debility and malnutrition.

"The oocyst of *I. belli* is described and a photomicrograph and a diagram of the postulated life cycle are presented."

Gentile, J. M. & Grasso, L. M. Primer caso de isosporosis humana observado en Córdoba (quinto caso Argentino). [**The First Case of *Isospora* Infection observed in Córdoba; the fifth Case in Argentina**] *Semana Méd.* 1955, May 12, v. 106, No. 19, 630–32, 2 figs.

The English summary appended to the paper is as follows:—

"The first case of human isosporosis caused by *Isospora belli* observed in Córdoba, being the fifth case in Argentine, is presented. Photomicrographs of the oocysts are exhibited."

Jones, C. C. **Coccidiosis. Report of a Case.** *Amer. J. Clin. Path.* 1955, June, v. 25, No. 6, 652–3.

"A case of human infection with *Isospora hominis* is presented. Technics for isolation and criteria for identification of the parasite are given. The probable life cycle of the organism is described."

Asami, K., Nodake, Y. & Ueno, T. **Cultivation of *Trichomonas vaginalis* on Solid Medium.** *Exper. Parasit.* New York. 1955, Jan., v. 4, No. 1, 34–9, 2 figs. [10 refs.]

The authors describe two methods for cultivating bacteria-free *Trichomonas vaginalis* on a solid medium. The flagellates were maintained serially in a fluid medium consisting of 1 gm. meat extract, 1 gm. peptone, 0·1 gm. cysteine hydrochloride, and 0·05 gm. agar, the mixture being dissolved by heating in 100 ml. water, after which 0·5 gm. glucose is added to it (*p*H 5·6); 0·1 per cent. methylene blue is added as an indicator and 4 ml. amounts of the solution are placed in test-tubes, which are autoclaved. Before use, 1 ml. of sterile human serum is added to each tube, together with 10,000 units of penicillin and 10 mgm. streptomycin, in order to inhibit bacterial growth. The solid medium is prepared by dissolving 2 gm. agar in 100 ml. of the fluid medium, leaving out cysteine hydrochloride and methylene blue; the agar is then cooled to 45–50°C. and 20 per cent. serum is added to the mixture.

This medium is poured out either into flat dishes or into test-tubes, in which it is allowed to solidify. The plate cultures are made in anaerobic dishes devised by Fortner (*Zent. f. Bakt.*, 1928, v. 108, 155). One side of the dish is occupied by the above medium, on the surface of which 0·2 ml. of the fluid trichomonad culture is spread, while the other side contains a culture of *Bacterium coli*, the function of which is to absorb oxygen. In the case of the test-tube cultures, inoculation of the flagellates is made by a stab (with platinum loop or pipette) before the medium is fully hardened.

Both in the case of the plate and stab cultures, the trichomonads grow in colonies which are visible macroscopically, as shown in the accompanying photographs. However, subcultures could not be maintained on plates, whereas serial transfers of the stab cultures showed active growth in successive subcultures. *C. A. Hoare*

RELAPSING FEVER AND OTHER SPIROCHAETOSES

Ordman, D. **Relapsing Fever in South Africa with a Record of its Occurrence in Europeans.** *South African Med. J.* 1955, May 28, v. 29, No. 22, 518–21, 1 fig.

Relapsing fever transmitted by *Ornithodorus moubata* occurs in the northern and eastern parts of the Union of South Africa but the infection rate in Europeans is very low. The author has found records of only 23 cases having occurred in the last 23 years. In only a few instances had the patient slept in a house likely to have harboured *Ornithodorus*, the infection in the other cases presumably having been acquired from other infected sites near African dwellings. A blood smear should be examined or a complement-fixation test performed in patients with recurrent fever from an endemic or adjoining area. *Frederick J. Wright*

Dias, J. A. T. S. Notícia sobre alguns hospedeiros vicariantes do *Ornithodoros moubata* (Murray) em Moçambique. [**Alternative Hosts of** *O. moubata* **in Mozambique**] *Anais. Inst. Med. Trop.* Lisbon. 1954, Sept.–Dec., v. 11, Nos. 3/4, 635–9. English summary (9 lines).

The association between warthog and porcupine burrows and *Ornithodorus moubata* has been recorded from several parts of Africa [this *Bulletin*, 1916, v. 8, 51; 1951, v. 48, 42; 1954, v. 51, 64; *Rev. Applied Entom.*, Ser. B, 1934, v. 22, 6). A total of 3 nymphs and 12 adults of this species of tick were collected from warthogs (*Phacochoerus aethiopicus*) in various localities in Mozambique during the years 1949–53. Although the warthog would seem to be the primary host of *O. moubata* in this region, small numbers of the tick collected from Lichtenstein's hartebeest (*Sigmoceros lichtensteinii*). lion (*Leo leo*), waterbuck (*Kobus ellipsiprymnus*) and the scaly anteater (*Manis* (*Smutsia*) *temminckii*) suggest that these animals also may serve as secondary hosts. According to the author, these facts have to be considered when initiating control measures against tick-borne diseases in Mozambique. *M. G. R. Varma*

Simons, H. C. R. Nachweis von Borrelien im Zentralnervensystem durch Desintegration mittels einer Thedanblau-Kaliumchloratmethode (TKM), zugleich ein technischer Beitrag zur Nachprüfung der Spirochätenätiologie der multiplen Sklerose. [**The Detection of Spirochaetes in the Central Nervous System by means of Disintegration in a Thedan-Blue-Potassium-Chlorate Medium (TKM), together with a Technical Study on testing the Spirochaetal Aetiology of Multiple Sclerosis**] *Ztschr. f. Hyg. u. Infektionskr.* 1955, v. 141, No. 3, 197–217. [56 refs.]

The author gives details of a method of examining brains or other organs of animals for the presence of spirochaetes, involving a mechanical and

chemical disintegration of the tissue in the presence of a saturated aqueous solution of potassium chlorate, and Thedan Blue, a saponin methylene blue addition product.

Examples are given of the results of examining the brains of mice infected with *Spirochaeta duttoni*, showing the way in which the organisms can be detected in extremely minute quantities of brain tissue. Moreover, dead spirochaetes retain their shape and withstand autolysis and decomposition for at least 38 days in mouse brains kept at a temperature of 3–4°C. The morphological findings were checked by comparing them with the results obtained by inoculating the infected brain tissue into experimental animals. The author found no support for the existence of any development cycle and considers that the various cyst-like bodies which have been described are artefacts.

He reviews previous work suggesting that spirochaetes are concerned in the aetiology of multiple sclerosis, and advocates the use of the method here described, as a sure means of determining the presence or absence of spirochaetes in cases of this disease. *Edward Hindle*

Baltazard, M., Pournaki, R., Bahmanyar, M. & Chamsa, M. *Ornithodorus tartakovskyi* Olenev 1931 et *Borrelia* (*Spirochaeta*) *latychevii* Sofiev 1941. Note complémentaire. [*Ornithodorus tartakovskyi* **Olenev, 1931 and** *Borrelia* (*Spirochaeta*) *latychevi* **Sofiev, 1941. A Supplementary Note**] *Ann. Parasit. Humaine et Comparée.* 1955, v. 30, No. 3, 225–42.

The authors provide further information concerning a small species of *Ornithodorus* found in burrows in the Meshed Province of Persia, and the spirochaete with which it is infected in nature [this *Bulletin*, 1952, v. 49, 957]. No further collections have been made but the examination of the original 56 lots has now been completed. The results confirm the view that the spirochaetal infection only exists in a low percentage of burrows, and in these the number of infected ticks does not exceed 10 per cent., probably the result of a natural resistance to the infection. Once infected, however, ticks transmit the infection by bite in all stages and remain infective throughout life. Transovarian transmission also occurs but in such a low proportion that it could hardly ensure the persistence of the infection in nature without the intervention of a vertebrate reservoir. *O. tartakovskyi* was also found to be unable to transmit, or even to maintain, any other spirochaete except *S. latychevi*.

The most probable vertebrate reservoir would seem to be the merion, especially *Meriones libycus*, as although the infection it shows is very slight, it is regular and persists for at least 60 days. This spirochaete is easily distinguished from all other species, except *S. graingeri* (*Parasitology*, 1953, v. 43, 133), by its low pathogenicity and complete absence of any neurotropism in vertebrates. *Edward Hindle*

YAWS AND OTHER TREPONEMATOSES

American Geographical Soc. **World Distribution of Spirochetal Diseases. I. Yaws, Pinta, Bejel.** *Atlas of Diseases.* Plate 15 (4 figs. & 5 coloured maps on folding pl.). [Numerous refs.] 1955. New York 32: Dept. of Medical Geography, Broadway at 156th Street. [$1.25 folded; $1.50 flat.]

This publication consists of a sheet 38 × 25 inches, giving 5 maps, 4 plates, notes on epidemiology, and remarks.

Map 1 shows the main areas where yaws and bejel are common, mean annual temperatures and rainfall; map 2 indicates the areas where pinta is most common; maps 3 a, b, and c show Haiti, the prevalence of yaws, geology, temperature, vegetation and rainfall; maps 4 a, b and c show Guadalcanal, yaws incidence, geology and temperature, vegetation and rainfall; maps 5 a, b and c show Thailand, yaws rates, soil and temperature, vegetation and rainfall. The plates show bone lesions of secondary yaws, pinta at an early stage (marked depigmentation) disseminated skin lesions and plantar hyperkeratoses.

In the note on epidemiology *yaws* is described and is thought to be distinct from syphilis; it is usually transmitted by direct contact but occasionally perhaps by a fly; its incidence is favoured by hot, moist conditions and low altitudes; cultural factors are the most significant; the disease is one of poverty, dirt and poor housing. Pinta is a disease of the tropical and subtropical regions of the Western Hemisphere, especially South America; it is clinically distinguished from yaws by the depigmentation.

Bejel occurs among the Bedouins of the Euphrates valley. The following regions are thus affected: Sudan, yaws commoner among pastoral than agrarian peoples; Angola, yaws prevalent in densely populated regions in rainy season; Australia, " boomerang Leg " is probably now considered to be due to yaws; in Bechuanaland the spirochaetosis is called *dichuchwa*; Brazil, yaws prevalent; British Somaliland, only occasional cases of yaws; Cameroons, yaws prevalent in forest and coastal areas; Ceylon, nearly free from yaws; Formosa, yaws prevalent at 1,800 metres; Guadeloupe and Guam, yaws almost disappeared; Jamaica, incidence of yaws has fallen from 90 per cent. to 1 per cent.; Marshall islands, yaws has fallen from 100 per cent. almost to nil; Philippines, yaws has fallen from 10 per cent. to 2 per cent.; Rhodesia, the spirochaetosis is known as njovera and could be yaws, bejel or non-endemic syphilis; Uganda, Nilotic people are the most affected; Yugoslavia, bejel-like condition (endemic syphilis), previously common, is being brought under control.

On the reverse of this publication there is a very complete bibliography.

T. E. Osmond

de Beaux, J. **Yaws in the Western Solomon Islands. Second Resurvey of the Island of Simbo in March 1955.** *J. Trop. Med. & Hyg.* 1955, June, v. 58, No. 6, 136–7.

The island of Simbo has a population of 560. The author has previously reported on a survey carried out 6 months after all those showing signs of yaws (and a few contacts) had been treated with penicillin [PAM] [this *Bulletin*, 1955, v. 52, 643]. The present report is of a re-survey made after a further 12 months. During this period one patient with a primary yaw, 21 with early secondary yaws, 28 with crab yaws and 9 with a tertiary ulcer were found and treated. The children of two affected families (number of children not stated) were new arrivals on the island. Six cases of secondary

yaws, 5 of crab yaws and one with a tertiary ulcer had previously been treated with PAM. The author again finds that relapses were more frequent among those who had been treated early in the course of the disease. Crab yaws also shows some resistance to treatment. In all, nearly 20 per cent. of the population has required treatment since the initial campaign. The author rightly concludes that in any future mass campaign in the Solomons it would be desirable to treat the whole population. *Frederick J. Wright*

LEPROSY

In this section abstracts are arranged as far as possible in the following order:—epidemiology, aetiology, pathology, diagnosis, clinical findings, treatment, control.

Leprosy in India. 1955, Apr., v. 27, No. 2, 35–171. **All India Leprosy Workers Conference, 1955, Jamshedpur.**

This is a special issue devoted to the All India Leprosy Workers' Conference held in Jamshedpur on March 5 and 6, 1955, and to the 2nd Biennial Meeting of the Indian Association of Leprologists which met on the 2 previous days.

The first part of the issue is devoted to short summaries of the papers read, and of the discussions which followed them, but at the end, 8 selected papers are printed in full. The subjects discussed included planning and administration, anti-leprosy work in India, mass education, the value of surgical and physiotherapeutic measures, the classification of leprosy, control with BCG and with special reference to chemotherapy.

In the Presidential Address G. V. Mavalankar mentioned that " the new Central Leprosy Teaching and Research Institute in Madras will, no doubt, make its own contribution in due course in all the aspects of the [leprosy] problem ". Mr. Nehru in a message to the Conference said: " I am glad that this fight against leprosy has been taken up in earnest in India. I wish it every success. I need not point out that we should work for positive health and well-being and not merely to cure illness ". Mr. Bailey of the Mission to Lepers got to the root of the problem when he said: " In the absence of . . . suitable personnel, any scheme of work, however intelligent it might be, was bound to be a failure. To overcome this shortage of dedicated individuals and to produce an army of such persons, every worker should make up his mind to win over at least one other individual to this cause. . . ."

The Director-General of the Health Services, Government of India, Lt. Col. C. K. Lakshmanan, made an important speech regarding the future policy of the Government. " Full advantage has got to be taken of the almost spectacular results of the sulphone therapy in . . . a campaign for the eradication of the disease. For this purpose, it would be essential to establish, both in rural and urban areas, special leprosy clinics in sufficient numbers in order to make the treatment readily available to the patients." He said that two types of control units were envisaged: " treatment units " and " study units ". A few pilot units had already been begun, and it was hoped to raise the number to 25. A sum of Rs.30 lakhs [about £225,000] had been allocated for the purpose in the remaining period of the First Five

Year Plan. Each unit would cover a population of about 50,000 persons in known endemic areas. The units had been provided with facilities for the assessment of the results of sulphone therapy, and for the study of yet unsolved problems in the epidemiology of the disease. " A careful watch will be kept on all contacts and they will be brought under treatment whenever necessary. Health visitors will make periodical domiciliary visits to ensure the fulfilment of the above objectives, and health education will form an integral part of the programme. The results will be assessed after another detailed survey after the scheme has been in operation for a certain number of years and in comparison with a control area where incidence of the disease will be studied but where no special measures will be undertaken apart from the traditional ones normally available in the area." It is also proposed to take up a trial of the value of BCG in association with one of the research units, this being given by mouth and with suitable controls. It is estimated that there are more than a million sufferers from leprosy in the country, but there are only 18,500 beds available and only 1,000 out-patient clinics for treatment. Special stress is to be laid on leprosy in the undergraduate curriculum and on post-graduate training of doctors.

It is not proposed to create a special cadre of Medical Leprosy Officers as few would desire to remain as leprosy doctors throughout life. He suggested that it would be better to " create workers with special training in the general field of epidemiology who could then be seconded for dealing with problems as they arise, be they in the field of leprosy, or tuberculosis or any other. It is far more desirable to create a multi-purpose doctor than the one qualified to deal only with one isolated aspect of any medical or public health problem ".

Regarding the planning of BCG trials, Dr. Mukerjee said: " One method of approach seems to be the selection of an endemic area with a more or less static incidence of leprosy, containing a sufficient number of child contacts, dividing the area into two, vaccination being given to one, and the other serving as control. A better method seems to plan the investigation in a familywise basis taking the area as a whole, half the number of lepromin negative contacts in a family being vaccinated and the other half serving as control. It is also important to keep the lepromin positive contacts in such families under observation at the same time."

Dr. R. V. Wardekar read a paper on methods of testing the prophylactic use of DDS in child contacts. All the children chosen should be lepromin tested and divided into groups. Lepromin-positive children are divided into 2 groups, one being given DDS and the other not, the 2 groups being comparable for assessing the results. The lepromin-negative children are inoculated with BCG and re-tested with lepromin. Those who become positive should be treated in 2 groups again as above. Those who persist as negative are divided into 2 comparable groups, the one being put on DDS and the other not. If sufficient numbers were tested in this way the results would be of value.

A paper read by Drs. Dharmendra and K. R. Chatterjee is of particular value as it covers a period of 20 years. The authors re-examined 680 persons who, as healthy subjects, had been tested with lepromin 15 to 20 years previously. After this period of years it was found that of the 156 negative reactors 9·6 per cent. had developed lepromatous leprosy, and 4·4 per cent. non-lepromatous leprosy. Of the 524 positive reactors only 3·2 per cent. had developed leprosy, and all these were of the mild non-lepromatous type. Further, in one of the experiments, done 20 years before, an attempt had been made to increase the reaction to lepromin by repeated testing, and for this purpose 3 tests were done in 109 of the lepromin-negative patients

in the course of one year. In 93 of these the reaction became positive (weak in 30, moderate in 35, and strong in 28). "It can not be said to what extent this conversion from negative to positive was a result of the repeated testing; however, since the positive result was seen after the repeated testing, these individuals should be excluded while assessing the value of a spontaneous lepromin reaction. Their exclusion will reduce the number of negative reactors to 63, while the number of positive reactors will remain unchanged (524)." A correlation of the results of the lepromin test on these 587 persons with the development of leprosy and type of disease shows that of the 63 negative reactors, 22·2 per cent. developed lepromatous leprosy, and 4·7 per cent. non-lepromatous. These findings point to the great prognostic value of the lepromin reaction in persons exposed to leprous infection. They lend support to the generally held view that compared to the contacts who have a positive lepromin reaction, those who have a negative one are likely both to develop the disease and get it in the more serious form.

Among the other papers that by Dr. Paul Brand was of outstanding interest and value, especially because of the hope he gave of remedying one of the most distressing disabilities of leprosy—drop-foot. He described briefly his technique: "Even as the median nerve is spared in the upper arm when the ulnar and radial may be paralysed, so in the leg the medial popliteal nerve is preserved when the lateral popliteal and posterior tibial are lost. It does not become paralysed until it has given off its branches to the gastrocnemius, soleus and tibialis posterior.

"This means that the tibialis posterior muscle is available for a tendon transplant operation for the correction of drop-foot. If this operation is planned, it is essential that all foot ulcerations should be soundly healed before tendon surgery is attempted. This tibialis posterior is then detached from its insertion and re-routed subcutaneously from the middle of the calf across the front of the ankle joint and inserted into the middle cuneiform bone.

"This operation has only been introduced recently for leprosy patients, and we are still following up the early cases. It is safe to say even at this stage that the results are encouraging and that the operation may be recommended for further trial."

The Conference was attended by 160 medical and non-medical delegates, and was held in India's great industrial city. *Ernest Muir*

Guinto, R. S., Rodriguez, J. N., Doull, J. A. & de Guia, L. **The Trend of Leprosy in Cordova and Talisay, Cebu Province, Philippines.** *Internat. J. Leprosy.* New Orleans. 1954, Oct.–Dec., v. 22, No. 4, Pt. 1, 409–30, 1 fig.

The Municipality of Cordova was surveyed for leprosy in 1933 and 1941, and resurveyed in 1948. The Municipality of Talisay was surveyed in 1936–37 and resurveyed in 1950–51. When the results in these two areas are combined the earlier surveys gave 19·3 per 1,000, and the surveys made 14 years later 18·5 per 1,000. Although lepromatous leprosy had diminished from 11·6 to 5·4 per 1,000, the non-lepromatous forms had increased from 7·7 to 13·1. These changes had occurred equally in both municipalities and in both sexes. The increases in the non-lepromatous forms was most marked in children. The yearly incidence for males with the lepromatous form was 0·39 per 1,000 person-years, and for females 0·11, with the non-lepromatous forms it was 0·82 for males and 0·67 for females. The total yearly incidence was 0·75 cases per 1,000 for non-lepromatous, and 0·25 for lepromatous

disease, the maximum being in the 10–14 age-group. The diminution of lepromatous leprosy was less pronounced in those who had been subjected to home infection as compared with those who had not been so exposed. The change over to the less severe forms, if maintained, would suggest that a gradual eradication of the disease is taking place. *Ernest Muir*

Gan, K. H., Soekardi Atmadja, R. & Kwa Tjoa Tjong Liam. **Concentration of Acid-Fast Bacilli in Skin Biopsy of Leprosy Patients and Contacts.** *Documenta Med. Geograph. et Trop.* Amsterdam. 1955, June, v. 7, No. 2, 136–9.

With the method of Khanolkar and Rajalakshmi [see this *Bulletin*, 1952, v. 49, 1048], no acid-fast bacilli were found in 20 clinically healthy leprosy contact persons; 4 out of 5 lepromatous type cases were positive in skin biopsies or nasal mucosa scrapings; in 10 tuberculoid cases 1 was positive in preparations from the nasal mucosa and the skin, 1 was positive in suspension preparations obtained by direct biopsy of the tissue, and 2 were positive by the concentration method. Of 18 undifferentiated type cases the direct method and the concentration method each yielded only 1 positive, whereas the concentration method gave a negative in 1 case positive by the direct method. As a result of their trials in 53 examinations (shown in 2 tables) the authors consider that the " concentration method of Khanolkar is perhaps to some extent a better method for the diagnosis of tuberculoid and indifferent [undifferentiated] leprosy than a single microscopical examination of nasal mucous membrane or skin preparations.

" We cannot decide whether the concentration method of Khanolkar yields better results than the direct microscopical examination of the biopsy tissue suspension. A definite concentration of the number of acid-fast bacilli could not be demonstrated in our cases." *Ernest Muir*

Jonquieres, E. D. L. & Masanti, J. G. Vacunación con BCG y viraje de la leprominorreacción en enfermos de lepra. [**BCG Vaccination and Reversal of the Lepromin Reactions in Leprosy Patients**] *Rev. Argentina Dermatosifilologia.* 1954, July–Dec., v. 38, Nos. 3/4, 137–44, 2 figs.

The English summary appended to the paper is as follows:—

" (1) BCG vaccination was performed in 55 lepromin-negative lepers classified in four groups as follows: (I) 16 ' residual ' [infections] of which one tuberculoid, three indeterminate and twelve lepromatous. (II) 11 ' recessive ' lepromatous with feebly positive baciloscopy. (III) 17 lepromatous in activity, remaining stationary after a long sulphone therapy. (IV) 11 lepromatous in full activity with little or no sulphone treatment.

" (2) 36 of all patients were previously tuberculin-positive (the control was pushed to 1/10 tuberculin). The tuberculin-positive cases were not augmented after vaccination.

" (3) In the group 1 (residuals), 4 patients (25 per cent.) became positive to the Mitsuda reaction (control by biopsy) and 3 showed a doubtful result, but only one (the tuberculoid one) maintained the positivity in an eight-month follow up. In the groups II to IV, only 8·7% developed doubtful results, which were not maintained.

" (4) Three patients of the group one showed accidents after the BCG vaccination: two developed acute lepromatisation and the latter, an erythema nodosum with general symptoms (loss of weight, fever). Weakly lepra reaction was seen in a few patients of the groups II to IV."

Dharmendra & Mukerjee, N. **Lepromin not inactivated by Lepromatous Serum.** *Leprosy Review.* 1955, July, v. 26, No. 3, 111–16.

The experiments described were made to test the findings of Ridley [see this *Bulletin*, 1955, v. 52, 53], that mixing and incubating sera from 2 lepromatous cases with lepromin destroyed the power of the lepromin to evoke a skin reaction in tuberculoid leprosy. In the present study, serum was used from 3 active and advanced lepromatous cases. Two different antigens were used: Dharmendra's refined antigen, and Wade's modification of Mitsuda's. Three controls were also used: lepromin and tuberculoid serum, lepromin and physiological saline, and lepromatous serum and saline. The patients, all of the tuberculoid type, were divided into 4 groups of 6 each, and each group was injected with a mixture of lepromin and lepromatous serum, together with 2 or 3 control mixtures. Results were read after 24–48 hours and after 5 weeks. The details of results in the 4 groups are given in tabular form. The early reactions to the lepromin-lepromatous-serum mixture were in no case less marked, but on the other hand were almost always more marked than those with the other two preparations. As in the case of the early reaction, the addition of lepromatous serum to lepromin did not inhibit the late reactions (not reported by Ridley). Thus the findings of Ridley were not confirmed in this connexion.

Ernest Muir

Edmundson, W. F., Wolcott, Rolla R., Olansky, S. & Ross, Hilary. **A Clinico-Serologic Study of Leprosy. I. Results of Serologic Tests for Syphilis, including the *Treponema pallidum* Immobilization Test.** *Internat. J. Leprosy.* New Orleans. 1954, Oct.–Dec., v. 22, No. 4, Pt. 1, 440–49. [16 refs.]

In this investigation 224 patients with leprosy were studied; 151 were males and 73 were females; 204 were lepromatous and 20 tuberculoid.

The serum tests (STS) employed were: Kahn standard, Kolmer (with cardiolipin antigen) complement-fixation, VDRL and Rein-Bossak slide flocculation tests; the TPI test was also carried out. The following were the percentage positivity rates of the various tests: Kolmer 63·4, Kahn 52·7, Rein-Bossak 51·8, VDRL 46·9, and TPI 11·2. Patients, negative to the TPI test, with the lepromatous form of the disease tended to give positive reactions to the STS more often than those with tuberculoid lesions; the age of the patient did not affect results but reactions tended to decrease with the duration of the disease.

Of complicating diseases, amyloidosis, diabetes and carcinoma did not affect the STS but pulmonary tuberculosis seemed to increase reactivity; changes in the various serum proteins did not affect the STS.

T. E. Osmond

Perrin, S. R. & Caplin, I. **Leprosy acquired during World War II.** *Arch. Dermat.* 1955, June, v. 71, No. 6, Sect. 1, 742–4, 4 figs.

In spite of the prediction of Aycock and Gordon in 1947 [this *Bulletin*, 1948, v. 45, 186] that there would be an appreciable increase of leprosy cases resulting from service in endemic regions during World War II, this is only the second that has been reported among the U.S. forces so far, apart from 2 patients in whom leprosy developed in tattoo marks. The present patient described is a Negro who worked in the navy, but was employed during the war in rounding up patients with leprosy in the Philippines. Although from the photographs and from bacteriological examination he

appears to be a very obvious case of the lepromatous type, there was considerable difficulty and delay in making a diagnosis, showing how necessary was Levan's comment to be " watchful for leprosy in veterans of World War II and the Korean campaign who have served in endemic areas ".

Ernest Muir

Landau, J. & Gabbay, A. **Ocular Leprosy in Israel.** *Acta Med. Orientalia.* 1955, May, v. 14, No. 5, 129–33. [13 refs.]

A clinical review of the ocular complications in 59 patients suffering from leprosy in the Hospital for Hansen's Disease in Jerusalem is recorded by the authors. The age of the patients varied from 4 to 60 years. Ocular involvement was present in over 90 per cent. The most frequent signs were the absence of the conjunctival and corneal reflexes; maculae and nodules on the skin of the forehead, superficial punctate keratitis, alopecia of the eyebrows, madarosis, thickened corneal nerves, iritis and lagophthalmos. Bilateral blindness occurred in two patients. There was no case of secondary glaucoma or interstitial keratitis. The possibility of a specific immunological state of the conjunctiva as distinct from other ocular tissues is discussed. The authors found that chemotherapy had a beneficial effect on the course of the disease but toxic side reactions occurred in some cases.

E. W. O'G. Kirwan

Doull, J. A. **Clinical Evaluation Studies in Lepromatous Leprosy. First Series: Diasone (Diamidin), 4-4′-Diaminodiphenyl Sulfone, Dihydrostreptomycin.** *Internat. J. Leprosy.* New Orleans. 1954, Oct.–Dec., v. 22, No. 4, Pt. 1, 377–402.

A study of the treatment of leprosy was made in 4 widely separated institutions: Aisei and Komyo in Japan, Eversley Childs Sanatorium in the Philippines, and the Westfort Institution near Pretoria in South Africa. The following drugs were used either alone or in combination: Diasone, DDS, dihydrostreptomycin, and PAS. The patients were suffering from lepromatous leprosy and were arranged in comparable groups. Control groups were arranged with PAS at Westfort, and with placebos at the other institutions. The trials took place for 32 to 48 weeks. The results were judged on clinical findings such as changes in infiltration and nodules and the healing of ulcers. Bacteriological changes were judged by comparisons of smears from 5 or 6 sites made before and after the periods of treatment. Lepromin tests were also done in all the patients.

All the drugs were beneficial in approximately the same degrees. An index of progress was devised in which complete disappearance of lesions in a whole group would be signified by the figure 2, and complete deterioration by −1. From 0·5 to 0·3 improvement was shown in the various groups. Combinations of drugs did not add to the effectiveness. One-sixth part of those on PAS showed improvement, and there were some improvements even among those on placebos, though most were stationary or deteriorated. Bacteriological results changed to negative in a few in each group, even in the controls; the percentages varied from 9·0 to 23·3 in the treated, and from 5·8 to 18·9 in the control patients. In a few patients the lepromin test changed from negative to doubtful or positive.

[This is the first widespread controlled trial of drugs that has been published in the treatment of leprosy. Other trials along similar lines are called for, priority being given to drugs which have given promising results in clinical or experimental tuberculosis. There are, however, 2 matters which require attention in future trials. Now that DDS has been established

as the treatment of choice, it should be used as the control in further trials. Any drug which does not produce comparable clinical results within at least 6 months should be abandoned; but in final comparisons, which should be based chiefly on bacteriological improvement, a much longer period, perhaps up to 5 years, may be necessary, unless outstanding superiority or inferiority is shown by the new drug. Also the considerable effect during that long period of general conditions and environment on progress under treatment must be taken into consideration.] *Ernest Muir*

Ramos e Silva, J. & Peryassú, D. Algumas observações sôbre o tratamento da lepra, particularmente da forma tuberculóide, pela estreptomicina só ou associada à sulfona. [**Some Observations on the Treatment of Leprosy, particularly the Tuberculoid Type, with Streptomycin, alone or in Combination with Sulphones**] *Brasil-Médico.* 1954, Aug.–Dec., v. 68, Nos. 32/52, 439–50, 13 figs. [13 refs.] English summary.

After referring to former published articles on treatment of leprosy with streptomycin, the authors describe their own experiences. They treated 27 out of 37 patients originally chosen, for periods of 3 months up to 3½ years, 20 being for more than a year. With the exception of 1 indeterminate case all were of the tuberculoid type. The dosage was 1 gm. of dihydrostreptomycin daily, in one or two intramuscular injections. The minimum total dose was 80 gm. and the maximum 180 gm. Of the 27 patients 26 showed a disappearance of all active signs. Lesions became flattened and lost their erythema. Nerves lost their thickening almost entirely and there was a considerable restoration of sensation. Histologically, there was quick change in the tuberculoid granuloma with a change of the epithelioid cells into vacuolated cells resembling those of Virchow. Later, lymphocytic infiltration alone remained, and this also gradually disappeared.

In addition to streptomycin, sulphone treatment was given later in case bacilli set free by the former drug might form fresh lesions. The authors, however, consider that the good results were due chiefly to streptomycin. In only 1 patient was there a relapse, with an outbreak of tuberculoid reaction occurring 5 months after all the lesions had apparently cleared up. *Ernest Muir*

Laviron, P., Lauret, L., Kerbastard, M. & Jardin, C. Le traitement de la lèpre par des injections mensuelles de 2,50 de diamino-diphénylsulfone. (Note préliminaire.) [**The Treatment of Leprosy with Monthly Injections of 2·50 gm. of Diaminodiphenyl Sulphone**] *Bull. Soc. Path. Exot.* 1955, v. 48, No. 2, 126–8.

The authors have for some time used intramuscular injections of a suspension of 1·25 gm. of DDS in 6 cc. of chaulmoogra esters, given twice a month [this *Bulletin*, 1951, v. 48, 1124]. The therapeutic results have been so good, and the reactions both local and general so slight, that they considered it worth while to try doubling the dose and giving it once a month. Fourteen lepromatous, 12 tuberculoid and 1 undifferentiated type patients were given this treatment beginning in February 1954. In 8 of the lepromatous patients (all of whom were new cases) there was a diminution of bacilli, 2 became negative and all improved clinically, particularly 10 of them. Of the tuberculoids 9 improved, 5 markedly, and the undifferentiated type case improved slightly. The blood concentration rose to 470 to 500 mgm. per litre after each injection, but fell again rapidly to become (except in 2 out of 10 cases) negative after the 15th day. In all the

14 patients there were only 6 slight reactions. The authors consider, however, that the dose may be unnecessarily large and that 2 gm. of DDS once a month may be enough. *Ernest Muir*

Floch, H. & Gélard, Anne M. La sulfone J.51 en thérapeutique antilépreuse. (Note préliminaire.) [**The Sulphone J.51 in Antileprosy Treatment**] *Bull. Soc. Path. Exot.* 1955, v. 48, No. 2, 133–7.

This substance is a mixture of two complex thymol disubstitutes of DDS. The authors, testing the amounts of DDS set free in the blood and urine, when 200 mgm. a day was administered, found that they were equivalent to the amounts found when 50 mgm. of DDS was given by the mouth. They discount the claim that these compounds are carried by the histiocytes instead of in the blood as with other sulphones. Because of the irregularity with which DDS is set free in the blood from these compounds, and because of the much greater cost, the authors are opposed to their use in place of DDS. *Ernest Muir*

Davidson, W. S. **Isoniazid Alone and Combined with Thiosemicarbazone.** *Leprosy Review.* 1955, July, v. 26, No. 3, 104–6.

The author in a previous paper [this *Bulletin*, 1954, v. 51, 1070] described improvement of leprosy cases at the end of 6 months' treatment with isoniazid. Further experience however showed that after a period of 6 to 9 months improvement was not maintained on this drug. Therefore 47 patients were put on INH 350 mgm. daily, and thiosemicarbazone 200 mgm. daily for 6 days a week as the combination had shown promise; this dosage was reached after about 2 months on smaller gradually increasing amounts. Of these, 22 patients suffered from toxic symptoms, chiefly neuritis and anaemia. After 10 months an index of progress of 1·2 was shown, which is regarded as satisfactory. It is considered that this form of treatment is suitable only in an institution under medical supervision. *Ernest Muir*

Laviron, P. & Kerbastard, M. Note préliminaire sur le traitement des maux perforants et ulcères lépreux par le déhydrocholate de sodium. [**Preliminary Note on the Treatment of Perforating and other Ulcers in Leprosy with Sodium Dehydrocholate**] *Bull. Soc. Path. Exot.* 1955, v. 48, No. 2, 129–33.

Following the work of Lemaire and Housset in the treatment of vascular and trophic affections with intravenous injections of bile salts, the authors used similar injections of sodium dehydrocholate in 11 leprosy patients suffering from perforating and other ulcers, some of which were of up to 3 years duration. Five perforating ulcers of 6 months to 2 years duration healed up rapidly. Eight others, some of them very bad and of long duration, were very much improved. In only one case did the improvement, rapid at first, not continue. A 20 per cent. solution is used and 5 to 10 cc. injected intravenously, very slowly, daily for 15 to 20 days. In no case has there been any bad result, though there is a bitter taste in the mouth and may be a feeling of nausea for about 10 minutes. The results obtained justify further trial of this method. *Ernest Muir*

Fisher, Cynthia. **Experience with the Treatment of Trophic Ulcers by Plaster Casts.** *Leprosy Review.* 1955, July, v. 26, No. 3, 107–11, 1 fig.

Ulcers of the sole of the foot present a very big problem to the leprosy worker. Dead bone when present must be removed, but apart from this rest of the foot is necessary. This is ensured, while the patient is able to remain ambulant and a minimum of treatment and maintenance is necessary, by the author's method of applying plaster casts. After rest in bed for 2 days to reduce swelling, dry dressings are applied to the ulcers and the leg bandaged with cotton from toes to knee without wrinkles. "Three six-inch and one four-inch plaster bandages were first applied for each cast over the cotton bandages, from below the knee to the base of the toes." Small wooden rockers (shown in an illustration) are then fixed to the instep with two 4-inch plaster bandages. The patient is then put to bed for 48 hours to allow the plaster to harden before walking. [The rocker, an essential part, is made locally and is a semilunar block of wood fixed to a 3/8 inch thick strip of wood shaped to the sole of the foot.] Plasters are inspected at least once a week. The optimum time for treatment is 3 to 4 months. Out of 65 patients treated in this way the plasters removed in 50 showed healing and readiness for weight-bearing in 50 per cent., while the other 22 per cent. had healed and 18 per cent. improved. *Ernest Muir*

Nakagawa, Y. & Nakamura, M. **Preservation of *Mycobacterium leprae-murium* by means of Lyophilization. I. Report.** *Kurume Med J.* 1954, v. 1, No. 3, 135–9.

Because of the impossibility of preserving *in vitro* serial cultures of *Myco. leprae murium*, a method of maintaining these organisms alive over long periods was sought, along the lines used for preservation of BCG and viruses. A uniform suspension of rat leprosy leproma was diluted 5 times, and equal quantities of this suspension were added respectively to: saline, saline with 10 per cent. inactivated bovine serum, 4 per cent. glycerin water, and 10 per cent. bovine serum in Kirchner's medium. These mixtures were placed in 1 ml. ampoules and immediately frozen and dried by rotary pump at room temperature. They were stored in a refrigerator at 4°C. Examination after 7 months, and again after nearly 2½ years showed: (a) that while the saline and serum dilutions were reduced to powder, the glycerin dilution remained glutinous and the Kirchner medium somewhat moist; but (b) that in all, the staining properties of the bacilli were preserved; (c) resuspension and inoculation into rats after each of these periods showed infectivity of all 4 suspensions, but most marked in the serum suspension and least in the glycerin. It is considered that the glycerin and Kirchner suspensions were less effective because they could not be completely dried. *Ernest Muir*

Hanks, J. H. **Relationship between the Metabolic Capacity and the Infectiousness of *M. leprae murium*; Refrigeration Studies.** *Internat. J. Leprosy.* New Orleans. 1954, Oct.–Dec., v. 22, No. 4, Pt. 1, 450–60. [12 refs.]

This is one of a series of articles by the same author [see this *Bulletin*, 1953, v. 50, 426; 1955, v. 52, 543] in which the relationship of the metabolism of mycobacteria, and particularly of the bacillus of rat leprosy, to

their infectiousness is studied. The two methods of gauging the metabolic activity are the respiration and the hydrogen transfer capacity (HTC) of the mycobacteria. While metabolic study may provide new insight into pathogenesis, the simultaneous inoculation of animals appears necessary in order to learn the " basic ground rules ". When these rules have been fully learned metabolic study will be able to replace the tedious and expensive observations in animals. The animals must, however, always be kept " as a court of final appeal ".

It was found that although at room temperature the HTC and the infectiousness of *Myco. leprae murium* deteriorated rapidly, washed organisms could be kept from deteriorating in a refrigerator for a fairly long time in a suspension in sucrose solution at *p*H 7·5. Still better results were obtained with albumin and yeast supplement added to the solution. *Ernest Muir*

Hanks, J. H. & Gray, C. T. **Extracellular Inhibitors in Leprotic Infections and their Role as Barriers to Experimental Transmission.** *Internat. J. Leprosy.* New Orleans. 1954, Oct.–Dec., v. 22, No. 4, Pt. 1, 461–8, 1 fig. [17 refs.]

The authors, using the hydrogen transfer capacity test and inoculation in rats, found that *Myco. leprae murium* was adversely affected as regards its endogenous metabolism and viability by exposure to serum taken from rats and other animals. This adverse effect occurs within the time during which it is known that inoculated mycobacteria lie in serous exudate prior to phagocytosis, and it is considered that possibly this process accounts in a similar way for the difficulty in transmitting human leprosy. In the case of *Myco. leprae murium* protection against such damage to the organisms may be obtained by prolonged refrigeration in albumin solutions. *Ernest Muir*

HELMINTHIASIS

In this section abstracts are arranged as far as possible in the following order:—Trematodes (*schistosomes, other flukes*); Cestodes (*Diphyllobothrium, Taenia, Echinococcus, other cestodes*); Nematodes (*Hookworms, Ascaris, Filarial worms, Dracunculus, etc., Trichuris, Enterobius, Trichinella, etc.*).

Montestruc, E. & Berdonneau, R. Étude du test de Thorn sur quelques éosinophilies massives. [**The Thorn Test in Massive Eosinophilia**] *Bull. Soc. Path. Exot.* 1954, v. 47, No. 6, 812–17.

All cases of eosinophilia were referred personally to the authors for a detailed blood examination. On those patients with eosinophilia exceeding 25 per cent. a Thorn's test (with corticotrophin) was done, and the aetiology of the eosinophilia was investigated. The purpose was to find out if an eosinophilia occurred other than that due to well-known causes, as in previous studies they had found massive eosinophilia in the tropics always to be associated with the recognized causation. In every one of 21 patients with gross eosinophilia now studied, an intestinal or a systemic helminthiasis was discovered. Details of the 21 cases are given in the text. The authors

state that during their work, which has involved many thousands of haemograms, they have not found one single case of " essential " eosinophilia. They therefore conclude that if such do occur in the tropics in the absence of parasites, and are in fact due to allergy or are of toxic or constitutional origin, they are so rare and exceptional that the words " tropical eosinophilia " can be erased from the vocabulary.

The Thorn test was positive in a few cases, but negative in many more; it is not discussed further.

[While various helminth infections have been found in the authors' cases it might not generally be accepted that some of these produced the degrees of eosinophilia recorded.] *A. R. D. Adams*

Edwards, E. E. & McCullough, F. S. **Studies on the Life-Cycles of** *Schistosoma haematobium* **and** *S. mansoni* **in the Gold Coast.** *Ann. Trop. Med. & Parasit.* 1954, June, v. 48, No. 2, 164–77, 3 figs.

This paper describes the necessary experimental work with indigenous snail vectors preparatory to a survey of the snail hosts of schistosomes in the Gold Coast. *Physopsis africana* and *Biomphalaria pfeifferi* were maintained successfully, in the open air, in biologically balanced aquaria or concrete tanks. These snails were infected with *Schistosoma haematobium* and *S. mansoni*, respectively, by exposure to miracidia hatched from ova contained in urine and stools from infected human cases. The technique employed for hatching schistosome ova was essentially that of repeated sedimentation in saline followed by stimulation in intense light in the presence of fresh water. For maintenance of strain, ova were hatched from the livers and intestines of experimentally infected mice. Half- to full-grown specimens of *P. africana* and *B. pfeifferi* were exposed *en masse* to unstated numbers of miracidia. [Further details of numbers of miracidia employed, the relationship of age of snail to susceptibility and the proportion of snails infected, would be valuable.] The exposed snails were maintained at 27°C. during the incubation period. *S. haematobium* in *P. africana* produced cercariae in about 32 days while the pre-patent period for *S. mansoni* in *B. pfeifferi* was about 27 days. White mice and baboons (*Papio anubis choras*) were exposed successfully to infection with *S. haematobium* while mice and monkeys (*Cercocebus lunulatus*) proved suitable hosts for *S. mansoni*. Infected mice did not pass viable ova of *S. haematobium* but a baboon produced viable ova in both urine and faeces by the 75th day after exposure. Viable ova of *S. mansoni* were found in the faeces of mice and monkeys 61 and 41 days, respectively, after exposure to infection.

The strains of schistosome, originally of human origin, were passaged successfully through the respective snail vectors for at least two complete cycles with *S. haematobium* and three cycles with *S. mansoni*.

A note is included on the variation in measurements of ova produced in man by *S. haematobium* indigenous in the Gold Coast. *O. D. Standen*

Newsome, J. & Robinson, D. L. H. **Investigation of Methods of maintaining** *Schistosoma mansoni in vitro*. *Ann. Trop. Med. & Parasit.* 1954, June, v. 48, No. 2, 194–200, 2 figs. on pl. [18 refs.]

The authors review the techniques that have been employed for the maintenance of schistosomes *in vitro*, and describe the development of a satisfactory method whereby the worms may be maintained alive for prolonged physiological and biochemical studies. Preliminary investigations involved the use of Carrel flasks containing equal parts of sterile Tyrode

solution and filter-sterilized human serum, but this method was considered unsatisfactory because of the difficulties in maintaining sterility consequent upon frequent changes of culture medium.

It was considered that any technique, to be successful, must include complete asepsis in removal of worms from the host and their transference to the culture medium, complete prevention of contamination of the medium, close approximation to the natural environment and facility for frequent changes of medium. Three types of apparatus were designed to fulfil these conditions, but that which finally gave satisfaction consisted of a gravity feed from a glass reservoir containing filtered horse serum to a side arm provided with a means of introducing the worms, an observation chamber of the Carrel flask type and a terminal withdrawal point closed by a rubber vaccine cap. The medium surrounding the worms in the observation chamber was replaced daily by withdrawing 3–5 ml. by sterile syringe and needle at the withdrawal point.

During the course of 30 experiments with this apparatus no contamination of the medium has occurred and the worms have been maintained in healthy condition for periods of up to 2 months. The authors consider that the ideal conditions have not yet been reached since the worms are not kept in a continuous flow of blood. [The original paper should be consulted for complete details of the apparatus and mode of procedure for its use.]

O. D. Standen

Fain, A. Étude sur les Schistosomes d'oiseaux au Ruanda-Urundi (Congo belge). Un nouveaux Schistosome du Tantale ibis (*Ibis ibis* Lin.), *Gigantobilharzia tantali* n. sp. [**Studies on Schistosomes in Birds in Ruanda Urundi, Belgian Congo. A New Schistosome of the African Wood** [**"Tantalus"**] **Ibis** (*Ibis ibis*), *Gigantobilharzia tantali*] *Ann. Parasit. Humaine et Comparée.* 1955, v. 30, No. 4, 321–8, 2 figs.

Chinese Med. J. Peking. 1955, Mar.–Apl., v. 73, No. 2, 100–106. **Some Aspects of Research in the Prevention and Treatment of Schistosomiasis japonica in New China.**

Largely political in flavour, this is a diffuse and undocumented account of a campaign by the Chinese People's Republic to control schistosomiasis in the regions south of the Yangtze river. There are many extraordinary claims and statements, including one that "the therapeutic efficacy of potassium antimony tartrate given orally is as high as 60 per cent." *A. R. D. Adams*

Dawes, B. **Maintenance** ***in vitro*** **of** *Fasciola hepatica.* [Correspondence.] *Nature.* 1954, Oct. 2, v. 174, 654–5.

The author has succeeded in keeping *F. hepatica* alive and in active movement for 12 days or more in the following medium (Hédon-Fleig solution):—

sodium chloride	7·0 gm.
potassium chloride	0·3 gm.
calcium chloride	0·1 gm.
sodium bicarbonate	1·5 gm.
disodium hydrogen phosphate	0·5 gm.
magnesium sulphate	0·3 gm.
glucose	1·0 gm.
distilled water	1000 cc.

The solution is passed through a Gallenkamp filter with a 6 cm. Ford Sterimat (grade *SB*), and tubes containing 25 cc. and plugged with cotton wool are incubated at 37°C. after the worms have been transferred to them from fresh livers; change into fresh sterile medium is made as desired.

Earlier methods had not succeeded in prolonging life for more than about 2 days. *Charles Wilcocks*

Faiguenbaum, J. & Donckaster, R. Consideraciones clínicas y epidemiológicas en relación con dos nuevos casos de difilobotriasis humana. [**Clinical and Epidemiological Considerations in relation to Two New Cases of Human** *Diphyllobothrium latum* **Infection**] *Bol. Chileno de Parasit.* 1955, Jan.–Mar., v. 10, No. 1, 15–17. [13 refs.]

The English summary appended to the paper is as follows:—

"*Diphyllobothrium latum* infection has been found to be endemic in some areas of the lake region in the South of Chile. Two new human cases are herein described. Both patients were from Santiago but they often travel to the endemic area for fishing. They used to eat raw or insufficiently cooked fish. Both had digestive and nervous symptoms and one of them showed also a skin eruption of allergic type. There were not hematologic alterations in any of the cases. The diagnosis was made in one of the patients by finding the typical ova in the faeces. In the other case, a segment of the tapeworm was spontaneously eliminated and identified at the laboratory. Both cases were completely relieved through the elimination of the worm by Atebrin treatment."

Fernández Nafria, A. Cisticercosis meningoencefálica múltiple (a proposito de un caso). [**A Case of Multiple Meningoencephalitic Cysticercosis**] *Med. Colonial.* Madrid. 1955, June 1, v. 25, No. 6, 546–50.

Swierstra, D. Beschouwingen over de epidemiologie van *Taenia saginata*. [**The Epidemiology of** *T. saginata*] *Tijdschr. v. Diergeneesk.* 1955, July 15, v. 80, No. 14, 647–55. [38 refs.]

The English summary appended to the paper is as follows:—

"The epidemiology of Taenia saginata is discussed. The different possibilities of the spread of the tapeworm eggs are mentioned and it has been tried to evaluate the relative importance of each possibility as thought to exist in the Netherlands."

Lidgett, K. **Hydatid Cyst of the Orbit: Report of a Case.** *Med. J. Australia.* 1955, May 28, v. 1, No. 22, 796.

"The clinical and pathological findings are reported of the second case of hydatid disease of the orbit recorded in Australia. The rarity of this condition in a country where hydatid disease is far from infrequent may be regarded as justification for the publication of this case."

Cassella, A. Contributo alla conoscenza delle parassitosi intestinali e, in particolare, dell'anchilostomiasi in provincia di Salerno. [**Study of Intestinal Parasitism, especially Hookworm Disease, in Salerno, Italy**] *Igiene e San. Pubblica.* Rome. 1955, Jan.–Feb., v. 11, Nos. 1/2, 60–70. [10 refs.]

The English summary appended to the paper is as follows:—

"The author exposes the results he has obtained through the microscopical examination of 2887 samples of faeces for researching intestinal parasites by respective rural workers of the province of Salerno.

"After having emphasized the incidence of the intestinal parasitism, particularly of Hookworm disease the author discusses and elaborates the relative endemiological data in order to obtain indicative principles, which may explain not only the spreading of ankylostomiasis, but also the conditions connected with the occurrence of the same infestation.

"The author also exposes the prophylactic means, and recommends to extend the compulsory insurance against the Ankylostoma infestation of the rural workers."

Triggiani, L. Focolaio di anchilostomiasi nel territorio del Comune di Gaeta. [**A Focus of Ankylostomiasis in the Commune of Gaeta (Italy)**] *Igiene e San. Pubblica.* Salerno. 1953, July–Aug., v. 9, Nos. 7/8, 515–22. English summary (6 lines).

Saccomanno, A. Per un focolaio di anchilostomiasi in provincia di Lecce. [**Ankylostomiasis Infection in the Lecce Province, Italy**] *Igiene e San. Pubblica.* Salerno. 1953, Sept.–Oct., v. 9, Nos. 9/10, 635–48. [11 refs.] English summary (5 lines).

Janssens, P. G. Een geval van acute ankylostomiasis. [**A Case of Acute Ankylostomiasis**] *Ann. Soc. Belge de Méd. Trop.* 1955, Feb. 28, v. 35, No. 1, 109–12. French summary (8 lines).

The following is a translation of the author's summary:—

The author records an acute case of ankylostomiasis in a young woman who had lived in Léopoldville for only 4 months. The course, symptoms, laboratory findings and treatment are described in detail.

In this connexion, the author draws attention to the fact that the same risks of infection are found in towns as in the bush. Their relative rarity makes them all the more dangerous because of the risk of a belated diagnosis.

H. J. O'D. Burke-Gaffney

Trincão, C., Franco, A., Gouveia, E., Nogueira, A. R. & de Oliveira, M. P. N. C. As porfirinas eritrocitárias na ancilostomíase. [**Erythrocytic Porphyrins in Ankylostomiasis**] *Anais Inst. Med. Trop.* Lisbon. 1955, Mar.–June, v. 12, Nos. 1/2, 25–8. [13 refs.]

The English summary appended to the paper is as follows:—

"The variations of erythrocytic proto and coproporphyrin in ankylostomiasis have been studied. Among 9 cases, the authors have found protoporphyrin values varying between 46·9 μgr and 221 μgr in 100 ml (mean 99·9 μgr) and coproporphyrin values between 0·2 and 2·8 μgr in 100 ml (mean 1·7 μgr)."

Trincão, C., Pinto, Gabriela L., Nogueira, A. R., Gouveia, E. & Parreira, F. A eliminação urinária de Tiamina pelos indígenas da Guiné Portuguesa, normais ou doentes de ancilostomíase, filariose e tripanosomíase. [**Urinary Excretion of Thiamine by Healthy Persons and Those Suffering from Ankylostomiasis, Filariasis and Trypanosomiasis in Portuguese Guinea**] *Anais Inst. Med. Trop.* Lisbon. 1955, Mar.–June, v. 12, Nos. 1/2, 29–33.

The English summary appended to the paper is as follows:—

"The per hour excretion of vitamin B_1 in natives of Portuguese Guinea suffering from ankylostomiasis, filariasis, sleeping-sickness, or in healthy subjects, does not show a greater deficiency of thiamine among those afflicted by parasitic diseases. Particularly the ankylostomiasis cases have not been benefited by associating vitamin B_1 to the iron medication."

Jara, A. B. Grau de tolerância para os Ancilostomidae na população escolar de Vila Henrique de Carvalho. [**Degree of Tolerance of Ancylostomidae in the Schoolchildren of Vila Henrique de Carvalho, Angola**] *Anais Inst. Med. Trop.* Lisbon. 1955, Mar.–June, v. 12, No. 1/2, 43–64. [21 refs.] English summary (7 lines).

In a study of this question the author examined 164 schoolchildren; some were white, some African and some of mixed descent. The examinations included surveys of faeces for ova, blood examination for parasites and for haematological data, and palpation for enlargement of the spleen. Details are given for each child in a series of tables, and the findings are discussed. In this area there is practically no schistosomiasis or filariasis, and amoebiasis is not common.

No great differences were found in the various examinations between the 81·7 per cent. in whom hookworm eggs were found and the 18·3 per cent. in whom they were not; the average red-cell count was 4,057,000 per cmm. and the haemoglobin percentage 81·3. Non-boarding boys at one school had rather lower red-cell counts and haemoglobin rates than the rest.

The author discusses the factors which may lead to anaemia, instancing deficiency in the anti-anaemic factor found in protein, and deficiency of iron in the diet, the loss of blood through parasitic infection (schistosomiasis, hookworm infection etc.), and the haemolytic process as in malaria. These factors are often responsible for anaemia unjustly attributed to hookworm infection, and the author, in fact, considers that the most important factor is nutritional.

[The paper contains much detailed information which would be useful to those making similar surveys.] *Charles Wilcocks*

Janz, G. J., Pinto, Gabriela L., França, C. S. & Barbosa, J. C. L. Estado de nutrição e infecção por Ancylostomidae. [**A Study of Nutrition and Infection by Ancylostomidae**] *Anais Inst. Med. Trop.* Lisbon. 1955, Mar.–June, v. 12, Nos. 1/2, 35–42. English summary (5 lines).

The object of this investigation was to estimate the possible interference exerted by hookworm infection on the nutrition of the host. The authors examined the faeces of 97 adult Africans, finding hookworm eggs in 55, of whom 13 were heavily infected. They also carried out red-cell and white-cell counts, and estimations of serum proteins, iron and vitamins, on all 97

persons. The general picture was of macrocytic anaemia of moderate degree.

The only significant changes found were a decrease in serum iron (112·8 mgm. per 100 cc. in the non-infected, 104·5 in the lightly infected, and 47·8 in the heavily infected) and a smaller diminution in urinary riboflavine excretion. There was no evidence that the hookworm infection modified the macrocytic anaemia which was characteristic of the non-infected group.

The authors conclude that in the first stage of hookworm infection a diminution of serum iron is the first observable change. *Charles Wilcocks*

Cassella, A. & Pontrandolfi, R. Contributo allo studio del parassitismo intestinale infantile nelle colonie estive. [**Intestinal Parasite Infection in Children at Summer Holiday Colonies**] *Igiene e San. Pubblica.* Salerno. 1952, Mar.–Apr., v. 8, Nos. 3/4, 166–9. [16 refs.] English summary (7 lines).

Of 430 children examined at various colonies in Italy, 19·76 per cent. showed infection with *Ascaris*, 4·65 per cent. with *Trichuris* and 0·9 per cent. each with hookworm and *Hymenolepis nana*.

Pallister, R. A. **Piperazine in the Treatment of Ascariasis.** *Med. J. Malaya.* 1955, Mar., v. 9, No. 3, 212–15.

The author treated three groups of patients. The first group were 22 adult males and females aged 16 to 43 and weighing 27 to 59 kgm., who were suffering from various diseases as well as *Ascaris* infection. They were given piperazine citrate in the form of 500 mgm. tablets, the daily dose being 50 to 103 mgm. per kgm. body weight given for 3 days, this dose being usually divided into 2 doses a day, although a few patients had 3 doses a day. Table 1 gives the daily doses of each patient, the number of worms passed on the 3 days of treatment and the following 2 days and the results of stool examinations done once only between the 6th and the 16th days, most examinations being done on the 14th day. The largest numbers of worms were passed on the second day of treatment. All the stools were negative except that of one patient and one other who passed no worms until he was later treated for hookworm infection.

The second group of 18 patients were similar to the first and received " a dose of 3 grams at night, followed by half an ounce of magnesium sulphate the next morning " (one woman with diarrhoea had no purgative). Table 2 shows the number of worms passed (mostly on the first day). On the 3rd day after treatment began eggs were found in the stools of 1 patient only, but subsequent stool examinations of 18 of the 20 patients revealed *Ascaris* eggs in 3.

The third group of patients were all children, weighing 6 to 20 kgm., and they were given a syrup containing piperazine citrate, a few being given Antepar. The doses were given usually 3 times a day for 3 days, but a few had a 5-day course, the children receiving daily 37·5 to 103 mgm. per kgm. body weight. The stools were examined for 5 days for worms, but subsequent stool examination for worm eggs was possible only in a few cases. Table 3 shows the results. Lack of stool examinations made it impossible to summarize them, but the author considered them to be " very satisfactory ".

One Malay woman, aged 20, had beri beri and on the 6th day after treatment with piperazine citrate she became very ill with high fever, fits and coma, but recovered. The cause of this illness was not diagnosed. No

other toxic symptoms were noted and children with heavy infections were not disturbed by the drug. The author found the drug simple to give, free from complications and extremely efficient and he thought it much more efficient than santonin and probably better than oil of chenopodium or tetrachlorethylene. It may be given to patients who are very ill without disturbing them and this is especially important when badly-nourished and debilitated children need treatment. The makers of the preparation used recommend a daily dose of 75 mgm. per kgm. body weight divided into 2 doses and the author considers that his results support this; but, for treating out-patients, the daily dose given to group 2 of his patients may be more convenient and economical. Hookworm eggs usually persisted after treatment with this drug.

G. Lapage

Swartzwelder, C., Miller, J. H. & Sappenfield, R. W. **Treatment of Ascariasis in Children with a Single Dose of Piperazine Citrate.** *Pediatrics.* Springfield, Ill. 1955, July, v. 16, No. 1, 115–17.

The authors briefly refer to some earlier work on the use of piperazine hexahydrate and citrate for the treatment of ascariasis [this *Bulletin*, 1955, v. 52, 62, 283, 916]. They treated 17 children weighing 19 to 58 lb. with Antepar syrup, which contains an amount of piperazine citrate equivalent to 100 mgm. piperazine hexahydrate per ml. The dose was measured in a paper cup and given as a single dose, most of the children receiving 70 mgm. per lb. body weight, the maximum dose being 3 gm. Neither purgatives nor fasting were used. Eleven children were treated in hospital and 6 through the hospital clinic. Stools collected before, during and after treatment were examined by the formalin-ether sedimentation technique. The egg counts before treatment varied from 1,300 to 93,100 eggs per ml. Examination of the stools in the hospital patients were done at intervals of 1 to 2 days during and after treatment until the stools were negative and the patients left hospital. The stools of patients treated at the clinic were examined 2 weeks after treatment.

Eggs of *Ascaris* were completely eliminated from the stools of 16 of the 17 children and there was a 93 per cent. reduction of them in the stools of the remaining patient. Table 1 gives details of the results. Both mature and immature ascarids were removed, the worms being intact and alive when they were passed out, although they were usually flaccid and sluggish. In the hospital patients the infections were usually completely eliminated in 1 to 4 days after the single dose of piperazine. No toxic symptoms were noted.

The single dose is simple and less expensive and the lower total dose lessens the risks of toxicity. The syrup may be given easily to children who cannot swallow pills. Because the worms are alive when they are passed out, the risk of absorption by the host of products of disintegration of the worms is minimized and, because the worms are sluggish, risks of their migration are reduced. Fasting and purgation are not required.

G. Lapage

Brumpt, L. C. & Ho-Thi-Sang. Traitement de l'ascaridiose et de l'oxyurose par les dérivés de la pipérazine. [**Treatment of Ascariasis and Enterobiasis with Derivatives of Piperazine**] *Bull. Soc. Path. Exot.* 1954, v. 47, No. 6, 817–22. [13 refs.]

The anthelmintic properties of piperazine became known when diethylcarbamazine (Hetrazan, Notézine, Banocide) was used for the treatment of

filariasis and ascariasis; it was suggested for the treatment of ankylostomiasis. The authors refer to literature already abstracted in this *Bulletin* on the treatment of ascariasis and enterobiasis with piperazine hydrate and citrate and to the work of TURPIN *et al.* (*Thérapie*, 1952, v. 2, 108) who treated enterobiasis with diphenyl acetate of piperazine. The authors themselves compared the action of Notézine, piperazine hydrate and diphenyl acetate of piperazine, with the following results:

Notézine. The detailed results obtained with this preparation are recorded by TRAN-TU-HIEP (*Thèse de Médecine*, Hanoi, 1954). With a dose of 10 mgm./kgm. body weight given for 5 days the results were:

	Percentage reduction of eggs by the 10th day = apparent efficacy	Percentage reduction of worms = real efficacy	Percentage cures after 1 course of treatment
Ascaris	88	68	50
Ancylostomes	71	20	0
Trichuris	46	0	0

The difference between the apparent and the real efficacy is, the authors say, due to temporary inhibition of egg-production and the apparent efficacy leads to excessive optimism.

Other derivatives of piperazine. For the treatment of ascariasis, the results were:

	Doses	*Cures after 1 course of treatment*
Diphenyl acetate of piperazine	0·075 gm./kgm. daily for 2 days	13 out of 16
piperazine hydrate	0·075 gm./kgm. daily for 2 days	78 out of 80
Notézine	0·010 gm./kgm. daily for 5 days	50 per cent.

The efficacy of the diphenyl acetate and hydrate is incontestable, but the authors have not followed up the patients treated for long enough to give percentage cures.

The efficacy of these anthelmintics is equal, or superior to that of santonin and oil of chenopodium and superior to that of hexylresorcinol and the chlorinated hydrocarbons or betanaphthol and thymol. The piperazine derivatives in general have insignificant toxicity and they are well tolerated, so that treatment with them is easy. But Notézine in doses of 10 mgm./kgm. for 5 days is badly tolerated by half of the patients. The authors have not, during several months, encountered any case in which these drugs were contraindicated. They are easily absorbed when they are given as a syrup,

solution or as granules, especially by children; dieting, purgation and fasting are not needed and the patients may continue their avocations. Santonin, on the other hand, is relatively toxic, needs very exact posology and is preferably not given to very young children. The composition of oil of chenopodium is variable and dosage of it by means of drops causes numerous errors. Even when the dosage is correct, poisoning may result and there are numerous contraindications to its use. Hexylresorcinol is less active and is difficult to give to children under 5, who chew the capsules and thus cause lesions of the buccal mucosa; it is less toxic, but an absolute fast before and after treatment is needed to give an activity of 70–90 per cent. In 12 patients treated with hexylresorcinol the authors obtained 4 successful and 8 incomplete cures. Where ascariasis and ankylostomiasis are both prevalent doctors may be tempted to use bivalent anthelmintics, such as thymol, betanaphthol, tetrachlorethylene or carbon tetrachloride, but actually none of them is active enough against *Ascaris*. Other vermifuges on the market tested by the authors have proved to have little or no value. The piperazine derivatives used have, however, no action against *Strongyloides*, hookworms, *Trichuris*, cestodes or trematodes. *G. Lapage*

Hanna, M. & Shehata, A. H. **Treatment of Ascariasis in Children with Piperazine Adipate.** *Brit. Med. J.* 1955, Aug. 13, 417–18. [11 refs.]

Piperazine adipate [this *Bulletin*, 1955, v. 52, 64] was used by the authors in Cairo for the treatment of ascariasis in a series consisting of 85 children, aged 1½ to 12 years. Before treatment ova of *Ascaris* were present in the stools of all patients, in addition, hookworm ova were present in 13, *Giardia intestinalis* in 4 and *Hymenolepis nana* in 3 patients.

In an attempt to determine the optimum dosage 3 different schedules were tried. The most successful, in which all of 35 patients were completely cured, consisted of a total dose of 0·75 gm. for each year of life up to 6 years, and 4·5 gm. from 6 years upwards, given in 4 equal divided doses, after meals, at intervals of 4 hours, for one day. There was no pre-treatment or special dieting. A mild saline purge was given on the day after the treatment. Follow-up stool examinations were made on the 2nd, 4th, 7th, 10th, 14th and 30th days after treatment. The hookworm and *Hymenolepis nana* infections were unaffected. Piperazine adipate has a pleasant acidulous taste and was taken readily by children as whole or crushed tablets. No toxic effects or side-reactions were observed. *Frederick J. Wright*

Krishnaswami, A. K. **Filariasis in Mangalore (South India).** *Indian J. Malariology.* 1955, Mar., v. 9, No. 1, 1–16, 3 maps & 5 graphs.

This paper records an investigation into the incidence of filariasis in the municipality of Mangalore, Madras State, during the period March–April 1954.

There is no protected water supply for the town, so that wells are the main source of domestic water supply, and there are a number of tanks. Cases of filariasis have been increasing during recent years. Surveys carried out during the past 4 years by the staff of the Madras Public Health organization show that the disease rate during these years has ranged from 2·2 to 4·7 per cent. and the microfilaria rate from 3·9 to 9·9 per cent.

The total population is 117,095, of whom 7,402 or 6·3 per cent. were examined. The number found to have filarial disease was 9·5 per cent.;

the microfilaria rate was 15 per cent., and the endemicity rate 24·2 per cent., while the average number of microfilariae per 20 cmm. was 40·3.

The incidence of filarial disease and infection shows much the same curve at different age-groups in both sexes. The elephantoid condition appears to show a steady increase with age, especially in females. The microfilaria rate shows a correlation with age in the earlier age-groups but beyond 20 years the index remains more or less steady. The youngest age at which microfilariae were detected was 2 years.

Developmental stages of microfilariae were found in *Culex fatigans* only. Out of 3,387 specimens 471 were infected—a rate of 13·9 per cent. Infection rates in March, April and May were 12·1, 15·1 and 17·6 respectively.

The vector mosquito finds abundant breeding places in cesspools, stagnant pools or drains, as well as in tanks. Iyengar [see this *Bulletin*, 1933, v. 30, 699] observed a centripetal distribution of filariasis in Trivandrum, but no such spatial distribution was revealed in Mangalore. He also made similar observations and explained the decrease in the microfilaria rate in the higher age-groups as being due to the onset of filarial disease. It may be as observed by Pandit *et al.* [see this *Bulletin*, 1930, v. 27, 989] that elements in the serum of persons with elephantiasis produce a reduction in microfilariae. *Philip Manson-Bahr*

Reitler, R. & Yoffe, J. **Filariasis in the Jewish Communities of Malabar.** *Acta Med. Orientalia.* 1955, Apr., v. 14, No. 4, 83–95, 1 fig. [11 refs.]

Large communities of Jews, some of whom wished to immigrate to Israel, exist in Southern India in the Travancore-Cochin State around the so-called "Malabar backwaters". This is a network of lagoons and long inland lakes, near the seaboard, interconnected by broad canals. The country is flat, irrigated by small waterways which serve the plantations. The ground water level is high. The humidity is also always raised because of the proximity to the sea and it reaches saturation point during the monsoons.

The whole Travancore-Cochin State, called in older times Kerala, covers an area of 9,105 sq. miles with a population of 9,280,119, and among them 1,982 Jews. The living standard is low, in spite of the fertility of the soil. The standard of education is remarkably high, only 10 per cent. of the population being illiterate.

The Jews of this country are divided into two groups—the "white" descendants from Spanish, Portuguese and Iraqi immigrants who comprise only 80 persons and the 1,902 "black" Jews whose origin is unknown. The existence of these people in the first and second centuries is attested by various reports. In 1524 the Moslems of Calicut destroyed their quarters, and they were subsequently persecuted during the Portuguese occupation in the 16th century. However, since the Dutch conquest in the 17th century, they have enjoyed a normal social life. They are now nearly all merchants. Their sleeping quarters are overcrowded, and two contiguous houses share one courtyard with a communal well, two factors which may affect the transmission of filariasis in the community. In one area in Mattancherry microfilariae were found in the stomachs of 11 out of 45 mosquitoes (*Culex fatigans*).

The conditions in the Malabar backwater are ideal for endemic filariasis, so it was decided to examine all the inhabitants in 5 communities of "black Jews" for clinical evidence of the disease, with results as follows:

Town of Ernakulam

Total number examined 909: overt filariasis in 181 (19·9 per cent.). The males affected vastly outnumbered the females.

Town of Mattancherry
Total number examined 262: overt filariasis in 54 (20·6 per cent.). Here again the males affected were nearly five times as numerous as the females.

Village of Mala
Total number examined 98: overt filariasis in 7 (7·3 per cent.).

Village of Chennamangalam
Total number examined 235: overt filariasis in 8 (3·4 per cent.).

Village of Parur
Total number examined 400: overt filariasis in 8 (2 per cent.).

In the first two towns the incidence of filariasis in males above 15 was 33·8 and 59·7 per cent. respectively.

The percentage of microfilaria carriers among 232 immigrants of either sex and belonging to all age-groups from the first two villages, just after their arrival in Israel, was 9·05 per cent. Examinations were made between 10 p.m. and 2 a.m. The youngest person examined was aged 6 years.

The danger of spread of filariasis to Israel is lessened by the seasonal breeding of mosquitoes, and by the temperature which reaches the optimum only for a limited period, with considerable differences between day and night. Another reassuring fact is that though in the war thousands of Indian and African soldiers were stationed in the Middle East, no endemic focus of filariasis developed there.

In order to make conditions safer still it was decided to give all immigrants from the endemic areas a course of treatment with diethylcarbamazine on arrival at the reception camp in Israel and it is proposed to give treatment at half-yearly intervals for the next two years. *Philip Manson-Bahr*

See also p. 1044, Demos *et al.*, **Malaria and Filariasis Investigation in Pescadores (Peng-Hu) Islands of Taiwan, Republic of China.**

Rosen, L. **Observations on the Epidemiology of Human Filariasis in French Oceania.** *Amer. J. Hyg.* 1955, Mar., v. 61, No. 2, 219–48, 1 fig. [Numerous refs.]

The epidemiology of non-periodic *Wuchereria bancrofti* was investigated from 1950 to 1952 in islands of French Oceania, with special regard to the infection of mosquitoes which consist of *Aëdes polynesiensis*, *A. aegypti*, *A. edgari*, *Culex fatigans*, *C. annulirostris*, *C. atriceps*, *C. marquesensis* and *Culex* sp.; the last was similar to *C. litoralis* and *C. sitiens* but its identity is uncertain. *A. edgari* is the only uncommon mosquito; *A. polynesiensis* is the most abundant. All except *C. marquesensis* feed on man at least to some extent with *A. polynesiensis* an aggressive day-biter. *A. aegypti* bites by day and by night, and the other species at night only.

Only *A. polynesiensis*, *A. aegypti* and *C. fatigans* commonly harboured in nature developing larvae of *W. bancrofti*, but only *A. polynesiensis* was found with infective larvae (18·5 per cent. of 233 specimens). Test feeds of all the species of the islands (except *C. marquesensis*) were made on indigenous non-periodic cases and also on a subject having a periodic *W. bancrofti* infection, who had been one year in the islands. *A. polynesiensis* proved an effective vector of the non-periodic form with infection rates up to 100 per cent., average individual infections up to 21·7 infective larvae per mosquito, and maximum infections up to 60 infective larvae in a mosquito. It was much less efficient for the periodic infection. *C. fatigans* gave commonly 93 per cent. infection rates with this periodic infection (mean and

maximum infections of infective larvae in a mosquito, respectively, 12·2 and 52 larvae) but corresponding data for the non-periodic infection were 27·3 per cent., 4·3 and 6 infective larvae per mosquito. Other facts show the differences of the two mosquito species as vectors of the two forms of filarial worm to be specific to the mosquitoes. *C. atriceps*, *Culex sp.*, and, particularly *A. edgari*, revealed some development to infective larvae for the non-periodic infection but this was not so with *A. aegypti* or *C. annulirostris*. Development took 4–5 days longer than in *A. polynesiensis*. Similar successful but slow development of periodic *W. bancrofti* happened with *A. edgari* but not in *C. annulirostris*.

The parasitological basis from which the mosquitoes are infected in nature is set out as informative, age-incidence tables for males and females in four-year age-groups from 0–4 to 60 years of age. Counts of microfilaraemia are from 20 cu.mm. samples of blood from 2,580 people, the bulk of the population. In males, the infection rate for microfilariae begins in the infant (0–4 years) group at 5·1 per cent., rising to 45·9 per cent. by 24 years and then remaining about 50 to 55 per cent. until 54 years when the incidence drops to 43·3 and 47·4 per cent. in the final age-groups. In girls and women, the infant group revealed 8·0 per cent. positive but the 50 per cent. level was not obtained until the 50–54 age-group. Microfilarial densities varied from 1 to 1,296 per 20 cu.mm., although most fell below 400 microfilariae per 20 cu.mm: a rough computation shows that microfilaraemias were, on the whole, greater in males in most age-groups than in females.

As regards the longevity of infected *A. polynesiensis*, there was no adverse effect on survival for the first week, little up to 9·5 days, but some indication of mortality due to their infections when infective larvae had formed about the 13th day.

In test feeds of *A. polynesiensis* on 23 different persons with average microfilariaemias ranging from 0·4 to 555·1 microfilariae per 20 cu.mm., the infection rates for infective larvae ranged, quite smoothly, from 5·3 to 100 per cent. and ranges for mean and maximum numbers per mosquito were, correspondingly, 1 to 21·7 and 1 to 60 larvae. There is, then, a direct correlation between the increasing microfilarial density of the infected host and the infections caused in the mosquito.

In a well-informed discussion, the author concludes that *A. polynesiensis* is likely to be infected by very low blood infections including, as the tables show, those from a person showing single microfilariae in 3 out of 8 samples of 20 cu.mm. of blood taken while the mosquitoes fed (*i.e.*, the mean density above of 0·4 microfilariae per 20 cu.mm.). For various reasons, it is singularly difficult to decide what density of microfilariae in the host constitutes the most dangerous source of ultimate heavy transmission to a further host. Deaths of heavily infected mosquitoes, failure of " overcrowded " larvae to develop normally in the mosquito, loss of infective larvae by failing to penetrate the wound in the host, are some of the complicating factors. It appears, the author concludes, that these factors may well tend to make most infected persons, regardless of their microfilarial densities, of equal significance as sources of transmission.

It is noted that age, sex and previous treatment with diethylcarbamazine did not affect the ability of circulating microfilariae to develop normally in *A. polynesiensis*; mosquito infections were not influenced by where they fed (hand, forearm or back).

It is accepted that the data recorded do not indicate the intensity of infection with or prevalence of adult *W. bancrofti*; the density of microfilariae in 10 persons examined every 2 hours over 48 hours revealed a rhythmic fluctuation with a peak in the late afternoon or early evening. This paper

deserves study in the original for its mass of tabulated data. It is noteworthy that steps were taken to differentiate all stages of *W. bancrofti* and *Dirofilaria immitis* of dogs in *A. polynesiensis*, in which mosquito species both worms develop successfully (*Ann. Trop. Med. & Parasit.*, 1954, v. 48, 318).

[For clinical studies on filariasis in French Oceania, see this *Bulletin*, 1953, v. 50, 47, 738.] *D. S. Bertram*

Jachowski, L. A., Jr. & Otto, G. F. **Filariasis in American Samoa. IV. Prevalence of Microfilaremia in the Human Population.** *Amer. J. Hyg.* 1955, May, v. 61, No. 3, 334–48, 6 figs. [16 refs.]

The authors, who have already made a considerable contribution to the knowledge of filariasis in Samoa [this *Bulletin*, 1953, v. 50, 50, 832], now add to this an assessment of their results in comparison with statistics of filarial disease compiled by others. They claim that their study of the natural history of this disease, supplementing existing information, provides an entirely new understanding of non-periodic filariasis in American Samoa and envisages a concept of diffuse sylvan foci of transmission for non-periodic *Wuchereria bancrofti* as contrasted with transmission in a domestic environment for the nocturnal periodic variety.

Microfilaria prevalence rates have been selected as indices of infection in the human populations; even though the method has many limitations it is the only practicable objective measurement of infection.

During the course of the research 2,421 Samoans were examined at least once for microfilariae, but many had been examined 12 or more times over a period of 5 years. A large proportion live in the 10 villages in the experimental control area (Jachowski and Otto, Research Report, Naval Medical Research Institute, Bethesda, Maryland, 1953, v. 11, 869). Except for children under 1 year, everyone in these villages is believed to have been examined.

Supplementary data were also derived from population surveys of Swain's Island, two additional villages on Tutuila Island and 3 special composite groups: the Fita Fita guards, Samoan nurses and high school students. A total sample of 60 cmm. of blood consisting of 3 thick smears, each of 20 cmm., were taken between 2.00 and 5.00 p.m. Giemsa stain was used as the routine method.

Microfilariae were found in 20·3 ± 0·8 per cent. of the 2,421 Samoans, who represented one-eighth of the population, and it is estimated that the prevalence of microfilaraemia in American Samoa is about the figure given above, an estimate which approximates closely to that of Murray [this *Bulletin*, 1948, v. 45, 807]. None of the children under 5 was positive, but in the next decade approximately 10 per cent. were so. Among 1,320 males 24·4 ± 1·2 per cent. showed microfilariae, whereas among 1,101 females only 15·5 ± 1·1 per cent. were positive. However, analysis of the data by age-groups reveals that these sexual differences in the microfilaria rates are not manifested until puberty. Commencing with this period of life, the microfilaria rates for the sexes diverge with a higher proportion of men than women infected. Approximately 10 per cent. of the boys in the 5–14-year age-group show microfilaraemia. The rates then increase until the 35–39-year age-group in which approximately 50 per cent. are infected. Thereafter the proportion of the male population with microfilaraemia becomes stabilized near this level. Approximately 10 per cent. of girls aged 10–14 are infected. Unlike the case of the males, this low microfilaria rate continues through the next two age-groups (15 to 24 years). After this

time the microfilaria rates increase, but remain near 25 per cent. in the succeeding age-groups.

Comparison of these data with those obtained from the same area—from American Samoa by Murray [*ibid.*, 1948, v. 45, 807] and Western Samoa by Buxton [*ibid.*, 1929, v. 26, 436], and from Fiji by Bahr (*London School Trop. Med. Res. Mem.*, 1912, 1)—reveals a remarkable similarity [expressed in graphs]. Even in 1920 Stephens and Yorke [this *Bulletin*, 1921, v. 17, 81] in a re-appraisal of Bahr's data from Fiji, were impressed with the difference between the microfilaria rates for the several age-groups infected with the non-periodic form of *W. bancrofti* and those hitherto reported for the nocturnal periodic form. Detailed analyses of data from British Guiana [Anderson *et al.*, *ibid.*, 1924, v. 21, 563], where highly domestic species such as *Culex fatigans* and *Anopheles darlingi* are the vectors, and St. Croix in the Virgin Islands [Hughens, *ibid.*, 1927, v. 24, 530] where the former constitutes the sole vector, demonstrate a rapid rise in the prevalence rates for both sexes which is in marked contrast to those of the non-periodic form. This suggests that, because of the highly domestic character of the transmission of the nocturnal periodic form, exposure to infection must take place early in life when the conditions are the same for both sexes.

Therefore the maximum rate of infection with the periodic form is attained within the first decade or decade and a half, and subsequently very little change is observed in the prevalence rates. It has been suggested in St. Croix that the decline is an index of better housing facilities for most of the older females than for the older males. *Per contra*, microfilaraemia with the non-periodic *W. bancrofti* is uncommon in the first decade of life. Although a greater proportion of males than females acquire infection after adolescence, the rates for both sexes level off in the third and fourth decades of life. There is no justification for the presumption on these grounds that the periodic and non-periodic forms of *W. bancrofti* may constitute two distinct species, but the age-specific rates are probably a reflection of the two different epidemiological patterns due to variations in the bionomics of the mosquito vectors. A similar difference in epidemiology has been reported by Senoo and Lincicome [see *ibid.*, 1952, v. 49, 426, 427] on the mainland of South Korea and on the Quelpart Island off the south-east coast. In both areas *W. malayi* has a nocturnal periodicity, yet the age-specific microfilaria prevalence rates are very different. It seems probable also that these differences in Korea result from differences in the bionomics of the local mosquito vectors and in the habits of the local population.

Of the theories proposed to explain both the differences in microfilaria rates between the sexes and the low incidence of infection in children, the differences of exposure risks among various sections of the population is the most logical.

In a preliminary report [*ibid.*, 1953, v. 50, 50] the authors indicated that transmission was sylvatic, whether within or without the village. Thus, 5 villages had extensive clearings round most of the houses, 7 were considered uncleared. The difference between the microfilaria rates for males living in the two types of environment was only 5·9 per cent., but a similar comparison of the females revealed significant differences—in 587 females in cleared villages 14·7 ± 1·5 per cent. were microfilaria positive, whereas 22·1 ± 2·5 per cent. of 266 living in uncleared villages were infected. Among the population living in cleared villages the difference between the sexes in the microfilaria rates in the first two decades of life is small. In the next group (20 to 24 years) the microfilaraemia is nearly 3 times as prevalent in the males as in the females. While the difference between microfilaria rates of the sexes living in bush environment, being based on small figures,

is difficult to interpret, it is evidently less pronounced than in villages with extensive clearings. Comparison by O'Connor in Ellice Islands [see *ibid.*, 1923, v. 20, 891] of the microfilaria rates by sex of the population over 16 living in villages with and without vectors revealed differences of approximately the same order as those in Samoa; similar differences in Fiji were recorded by Bahr. When the total rates for both sexes in the same environment are compared, children in the uncleared villages show 15·6 ± 3·4 per cent. infected against 6·9 ± 1·6 per cent. for children in the cleared villages, which constitutes a statistically significant difference.

[The opinions expressed in this paper and the conclusions tentatively arrived at follow the same lines of thought entertained by the reviewer in 1952 [*ibid.*, 1953, v. 50, 231] and also in 1955 (*Trans. Roy. Soc. Trop. Med. & Hyg.*, 1955, v. 49, 127 [this *Bulletin*, 1955, v. 52, below, p. 1117]).

Philip Manson-Bahr

Winter, H. "Tropische Eosinophilie" als symptomarme Filariasis. ["**Tropical Eosinophilia" as a Manifestation of Filariasis**] *Ztschr. f. Tropenmed. u. Parasit.* Stuttgart. 1955, Apr., v. 6, No. 1, 99–105, 2 figs. [11 refs.]

In 1939 [this *Bulletin*, 1939, v. 36, 838] Meyers and Kouwenaar found microfilariae of *W. malayi* in sections of a lymphatic gland from a patient with "tropical eosinophilia"; later Van der Sar and Hartz in 1945 in Curaçao [*ibid.*, 1945, v. 42, 837] found those of *W. bancrofti*, and Reisel and Groen [*ibid.*, 1951, v. 48, 825] found living microfilariae by gland puncture under the same circumstances.

In 3 male patients under the author's care in Giessen, Germany, who had lived for some years in S.E. Asia microfilariae were found in smear preparations from excised lymph glands. In morphology they were undoubtedly embryos of *W. malayi*. The clinical symptoms and signs were those usually ascribed to tropical eosinophilia. They were hyperleucocytosis with hyper-eosinophilia, enlargement of spleen, lymphadenitis and allergic pulmonary manifestations. It is suggested that what is usually known as tropical eosinophilia may be regarded as an accentuated state of sensitivity in persons predisposed by filarial infection.

Philip Manson-Bahr

Burch, T. A. **Treatment of Wuchereriasis and Onchocerciasis with Suramin Sodium.** *Amer. J. Trop. Med. & Hyg.* 1955, Mar., v. 4, No. 2, 332–3.

The author, with Ashburn [this *Bulletin*, 1952, v. 49, 74] had used suramin sodium in the treatment of onchocerciasis in Guatemala. He has now employed it in onchocerciasis and *W. bancrofti* infection in Liberia, where surveys had shown that 25·6 and 16·4 per cent. of the local population examined suffered from these diseases respectively.

Suramin was given intravenously in 6 to 9 weekly injections to 20 patients with onchocerciasis and 21 with *W. bancrofti* infections. The initial dose was 0·5 gm. and subsequent doses 1·0 gm. (halved or omitted in the presence of albuminuria). Total dosage varied from 3·5 to 7·5 gm. and 0·08 to 0·15 gm. per kgm. Skin biopsies and scarification smears were taken from patients with onchocerciasis and thick blood films (20 cmm. at 9 p.m.) from those with *W. bancrofti* infections.

"Various aches and pains and chills and fever" were very common during treatment, but could not be positively related to it. Five patients developed pain in the groin or scrotum and one of them had acute lymphangitis: all had

had similar attacks before. None developed hyperaesthesia of the soles of the feet, which was so common in Guatemala.

Tables show that of 17 patients with onchocerciasis who were followed up only 7 had positive skin biopsies 1 to 2 months after treatment and this figure fell to 2 after 8–10 months.

In the case of *W. bancrofti* infection the pretreatment figure of 53 microfilariae per 20 cmm. rose to 65 during treatment, fell to 29 after 3 to 4 months and rose again to 40 after 10 to 13 months. It would appear that intravenous suramin in the dosage used had a toxic but not lethal effect on *W. bancrofti*. *H. J. O'D. Burke-Gaffney*

Trans. Roy. Soc. Trop. Med. & Hyg. 1955, Mar., v. 49, No. 2, 97–157, 1 map & 4 figs. [Numerous refs.] **Symposium on Loiasis** [arranged by R. M. Gordon]. **I. A Brief Review of Recent Advances in our Knowledge of Loiasis and of some of the Still Outstanding Problems** [Gordon, R. M., 98–105]. **II. The Tabanid Fauna of Streams at Kumba, British Cameroons** [Crewe, W., 106–10]. **III. Some Comments on the Species of *Chrysops* bred and collected at Kumba, British Cameroons** [Oldroyd, H., 111–14]. **IV. The Development of *Loa* in Flies of the Genus *Chrysops* and the Probable Significance of the Different Species in the Transmission of Loiasis** [Duke, B. O. L., 115–21]. **V. The Morphology of the Larval Stages in the Vector: some of the Problems involved** [Buckley, J. J. C., 122–6]. **VI. Pacific Filariasis** [Manson-Bahr, P., 127–31]. **VII. Periodicity of Microfilariae of *Loa loa*** [Hawking, F., 132–42]. **VIII. The Epidemiology of Infections with *Loa loa*** [Kershaw, W. E., 143–50]. **Discussion** [McRobert, G.; Bertram, D. S.; Woodruff, A. W.; Macdonald, G.; MacArthur, W.; Gordon, R. M. (in reply), 151–7].

[It should be noted that the following abstracts were prepared from the published papers, whereas at the meeting each author presented merely a summary of what he had previously written.]

I. R. M. Gordon in his review of the parasitological and entomological aspects of loiasis stated that it appeared proven that filarial worms, which on general examination are morphologically indistinguishable from *Loa loa*, occur in various species of monkeys which inhabit the rain-forest in Nigeria, and that in addition to *Chrysops silacea* (which together with *C. dimidiata* is the principal vector of *L. loa* to man) various other species of *Chrysops* are concerned in the transmission of monkey loaisis.

It has been established, with reasonable certainty, that the microfilariae derived both from human and from simian sources can undergo development to the infective stage in various, possibly all, species of *Chrysops*; it has also been established that the infective forms found in wild flies when injected into monkeys develop to maturity and the resultant female worms produce microfilariae indistinguishable from *L. loa*.

It is possible that the part played by *Chrysops* in the transmission of human and monkey filariasis may be similar to that played by *Glossina* in the transmission of human and animal trypanosomiasis, that is to say that the same species of vector carries two distinct species of parasites whose vertebrate hosts are not interchangeable. On the other hand it appears probable, although it is by no means certain, that the strains of monkey and human *Loa* are interchangeable and can infect either host. Thus the transmission of loiasis by *Chrysops* may be similar to the transmission of yellow fever by mosquitoes, *C. langi* and *C. centurionis* transferring the disease from monkey to monkey in the forest canopy remote from human

habitations, while in areas where monkeys occur and the forest encroaches on human habitations the disease is transmitted from monkey to monkey by various species of *Chrysops* including *C. silacea* and *C. dimidiata*, the latter descending and transferring the disease to man when he comes within visual range of the canopy. Finally, in those areas where the monkey reservoir is absent, as at the rubber estate in Sapele, loiasis is spread from man to man almost exclusively by *C. silacea* and *C. dimidiata*.

Although this appears to be the probable picture, before it can be accepted as factual two outstanding problems remain to be solved. In the first place it is necessary to establish beyond reasonable doubt that the human and monkey strains of *L. loa* are physiologically identical (whether they are morphologically indistinguishable is relatively unimportant) in so far as being interchangeable in the human and simian hosts. In the second place it is necessary to link up the life-cycles of the various species of *Chrysops* with these two types of loiasis. It is known that the various species of *Chrysops* tend to breed in similar habitats and that their common breeding ground extends deeply into the rain-forest as well as being in close proximity to native villages. At present our knowledge of the mating and breeding habitats of the vectors extends little beyond these broad facts, and we are almost completely ignorant of their movements from the time they have left the breeding ground until they are captured coming to bite man or monkey.

As regards the development of the parasite (*L. loa*) in the vector and in the vertebrate host, it has been shown that in the case of *L. loa* in man the biting fly takes up a large blood meal (some 50 cmm.) which contains a concentration of microfilariae similar to the concentration in the peripheral blood. It has been shown that during the next 10–12 days a remarkably high proportion, probably the vast majority, of the ingested microfilariae develop to the infective stage, and that an unestimated but reasonably high proportion of these infective forms escape from the feeding fly into the tissues of the human host during the course of the next blood meal.

In these circumstances one would except to find that in areas where the infective density of *Chrysops* is high a correspondingly high proportion, possibly 100 per cent., of the indigenous adult population would show the presence of the microfilariae of *L. loa* in the peripheral circulation. Until recently we inclined to the belief that this was not the case and that even in hyperendemic areas, where there was no monkey reservoir and all infections observed in wild flies must have come from a human source, some 50 per cent. of the adult population were free from the microfilariae of *L. loa*. More recently, however, we have acquired evidence which suggests that more intensive examination of the blood of these persons will reveal the presence of microfilariae in the majority of the adult population.

This, as yet incompletely established belief, in no wise alters the fact that the density of the microfilariae in the blood of persons living in hyperendemic areas is far less than might be expected from a previous study of the vector population. We have no obvious explanation for this discrepancy which may or may not be due to the acquirement of resistance, and we are still ignorant as to whether the low density of the microfilariae is caused by the destruction of the worms at some stage of their development in the human host, or whether it is due to a suppressive mechanism which, although not destroying the worms, holds back the microfilariae from the peripheral circulation.

H. W. Crewe discussed the breeding places of *Chrysops* and pointed out that up to 1948 four species of *Chrysops*, namely *C. silacea*, *C. dimidiata*, *C. longicornis* and *C. distinctipennis*, had been recorded from

Nigeria and the Cameroons; and these were the four species which, in the light of information then available, might have been expected to occur in an area where loiasis was prevalent. All the records of *C. distinctipennis* were from savannah, and those of the other three species from forest. Only *C. silacea* and *C. dimidiata* had been recorded from Kumba. Since then, four species of *Chrysops* had been caught in nature at Kumba, these being *C. silacea* (the vast majority of the population biting man), *C. dimidiata* (less than 0·5 per cent. of this population), *C. langi* (three specimens) and *C. centurionis* (one specimen). The specimens of *C. langi* and *C. centurionis* were found at canopy level in the forest, and would not have been taken by normal collecting methods which sample only those Tabanids attacking man at ground level.

The European station at Kumba is situated in a cleared area, about 1,000 feet across on an average and 2,000 feet across at its widest, on a spur running out from an extinct volcano; the houses being approximately at the level of the surrounding forest canopy. Tabanid larvae were collected from 7 sites in the Kumba area; the collecting apparatus used was very simple but was adequate for unsupervised qualitative collections by the African staff. Five of the sites are in the streams flowing in the valleys which flank the spur on which is the residential area, and are where the margins of the native farms meet the forest. The sixth site is in a similar stream, but is some distance from the residential area and is in the forest where there is no permanent stream, the larvae being collected from the swampy patches formed in small valleys during the rainy season.

The flies which emerged in the laboratory from these larvae and pupae which were cultured individually were males and females of *C. longicornis*, *C. langi*, *C. silacea* and *C. griseicollis*, females only of *C. dimidiata* and *C. maximus*, and both sexes of *Tabanus severini*. It is not proposed to discuss here the general entomological significance of these results, but only to consider the possible importance of the findings in relation to our ideas concerning the transmission of loiasis.

In the Kumba area *C. silacea* is the only vector of importance in the direct transmission of loiasis to man, as it forms almost the entire *Chrysops* population in the European station, in the native town, and at ground level in the surrounding forest. However, the most common species bred in the laboratory are *C. longicornis* (30 per cent. of the total), *C. langi* (29 per cent.) and *C. silacea* (26 per cent.), and as these together constitute over 85 per cent. of the sampled population it is proposed to consider them alone.

It seems reasonable to suppose that *C. longicornis*, *C. langi* and *C. silacea* will between them constitute the bulk of the *Chrysops* fauna of any breeding place near Kumba similar to those investigated (*i.e.*, muddy streams or swamps) and also that unless there is another common type of breeding place with a different *Chrysops* population, they will prove to be the major constituents of the *Chrysops* population of the forest canopy. *C. langi* has been shown to be capable of transmitting human loiasis as efficiently as the better-known vectors *C. silacea* and *C. dimidiata*, and is probably capable of transmitting the similar monkey loiasis. So far all attempts to induce *C. longicornis* to feed on human volunteers in the laboratory have been in vain.

Both *C. longicornis* and *C. langi* must normally obtain their blood meals from animals other than man, and it is possible that they are mainly responsible for maintaining the monkey reservoir of loiasis, while *C. silacea* is responsible for the transmission of infection from man to man, and perhaps between man and monkey.

III. H. Oldroyd, who visited the Cameroons in 1949 and who has been responsible for the identification of most of the tabanids collected in this area, is of the opinion that the Tabanidae of tropical Africa seem to have evolved mainly in the non-forested areas, ranging from deciduous woodland, through grassland, to arid, semi-desert areas. The Tabanidae of the equatorial rain-forest may have been derived from this source by a series of incursions. Moreover, few rain-forest species live at ground level, where game is scarce, and most of them are canopy-dwellers.

The genus *Chrysops* fits into this general picture. Previously divided into two subgenera, *Kleineana* and *Chrysops* proper, it is now seen to be better classified into a number of small groups of related species. The true home of *Chrysops* seems to be in the savannah woodland, and the forest species can be regarded as having been derived from 4 separate species groups.

It seems likely that the ability to tolerate and to transmit the microfilariae of *L. loa* is not specific, but that most, or all, species of *Chrysops* have this ability to some extent. In practice the effective vector is that species whose behaviour brings it into contact with man at the relevant intervals. Since there is wide variation in behaviour between quite closely related species this is an important line of investigation.

IV. B. O. L. Duke, in his paper, brings together and critically examines the available information on the development of *L. loa* from man, and of a similar parasite from monkeys, in various species of *Chrysops*, and correlates these findings with the biting habits of the flies. In the laboratory complete development of *L. loa* from man has been demonstrated in *C. silacea*, *C. dimidiata*, *C. langi*, *C. centurionis*, *C. zahrai* and *C. distinctipennis*. In the field *C. silacea* is by far the most important vector of the human parasite; its biting habits and particularly its attraction to wood smoke bring it into close association with man and it is the most numerous and widespread man-biting *Chrysops*. The habits of *C. dimidiata* are similar, but except in certain areas this species is much less numerous. *C. zahrai*, *C. distinctipennis* and *C. centurionis*, more furtive in their habits and less closely associated with man, are local or subsidiary vectors to be found on the fringe of the area wherein loiasis is endemic.

There is considerable evidence that a proportion of natural infections with *Loa* in monkeys from the rain-forest show microfilariae with a nocturnal periodicity, but a single monkey experimentally infected with infective forms of *Loa* of probable human origin showed microfilariae with a diurnal periodicity. Microfilariae of *Loa* from monkeys have been shown to develop to infective forms in *C. silacea*, *C. dimidiata*, *C. langi* and *C. centurionis*. It is suggested that the parasite may be transmitted from man to monkey and vice versa by *C. silacea* and those species which commonly bite man, whereas *C. langi* and *C. centurionis*, which are now known to be evening and nocturnal biters at forest canopy level and are entirely or mainly zoophilic in nature, are probably responsible for much of the transmission among monkeys.

V. J. J. C. Buckley drew attention to the fact that there were still some morphological problems to be solved in regard to *L. loa*, and these concerned not only the identification of the adult forms found in man and monkey but also the identification of the developing forms as seen in the insect vector and in the vertebrate host. The development of *L. loa* in *Chrysops* spp. as described by Connal and Connal in 1922 [this *Bulletin*, 1922, v. 19, 654] is discussed and comment is made on their finding of only a single ecdysis in the insect host; it is thought that 2 ecdyses occur in this species as in other species of filariid parasites. Comparison of the development of *Loa loa*

in *Chrysops* with recent descriptions of the development of *Wuchereria malayi* and *W. bancrofti* in their insect hosts indicates that more detailed study of the larval development of *Loa loa* is desirable. Attention is drawn to the discovery of Chabaud (*Ann. Parasit. Humaine et Comparée*, 1954, v. 29, 206) that it is possible to differentiate the sex of 3rd stage larvae of *Dipetalonema blanci* by the position of the genital rudiment; further study of this organ in the filariid parasites of man might lead to some interesting lines of research. The lack of knowledge of the post 3rd stage development in filariid parasites is mentioned, and suggestions are put forward as to how further information concerning this phase might be acquired.

VI. Sir Philip Manson-Bahr pointed out that in the nocturnal periodicity of *Wuchereria bancrofti*, the diurnal habit of *Loa loa* and the lack of periodicity of the Pacific variety of *W. bancrofti* are probably the key to host-parasite relationship in the family (Filariidae). It is certainly difficult to account for a periodicity or lack of periodicity in the Pacific filaria, if it is regarded as an adaptation to the day-biting habits of *Aëdes scutellaris pseudoscutellaris* or *A. s. polynesiensis*, as in this case, logically speaking, the periodicity should be diurnal. Most workers are agreed that in the Pacific filaria-infested belt, an area of 4,000 × 1,700 miles, the night-biting *Culex fatigans*, which is the optimum host for the nocturnal *W. bancrofti* in other parts of the tropics, has not become adapted as an efficient intermediary as it is a species which has been recently introduced into the Pacific Islands by human agency, and there are islands in the Ellice and Marquesas groups where filariasis is rife and where *A. s. polynesiensis* is the sole species of mosquito present.

This then disposes of any doubt as to which species are the main vectors in the non-periodic filariasis. However, the large isolated island of New Caledonia, which lies south of the nocturnally periodic zone of the New Hebrides, presents a problem. Here the filaria is non-periodic and the vector is *Aëdes vigilax* which is a day biter and which is widely distributed in Queensland. No members of the *Aëdes scutellaris* group have been discovered there and moreover clinical filariasis, in contrast to that encountered in the Central and South Pacific, is particularly non-pathogenic, so that elephantiasis is rare, even in localities where the microfilaria rate is every bit as high as in the islands of the Fiji and Samoa groups.

In comparing these two clearly demarcated regions, the periodic and non-periodic in the Pacific, and in trying to interpret the factors which govern the incidence of filariasis, as well as its intensity, it is necessary to assess the climatic, ethnological and ecological surroundings, as well as the social aspects of the peoples concerned. In the Melanesian Islands, where nocturnal filariasis is found, night-biting mosquitoes of the *Anopheles punctulatus* complex and *Culex fatigans* are the vectors. There, in general, the vectors are house-haunters, feed at night in the primitive huts of these people, and later use them as resting places. In other words, filariasis in Melanesia is a domestic infection and therefore the disease tends to be localized and have a patchy distribution.

In the Central and South Pacific, which contains the non-periodic zone, circumstances are different. As has been shown by American workers in Samoa *A. s. polynesiensis* is mainly a rural mosquito which clings to herbage in the bush, whence it can pounce upon its victims in daylight. Being a bush-frequenter it is rarely found inside houses. This probably accounts for the fact that has frequently been attested that the men working on their plantations are constantly more heavily infected than the women. But this is not always the case when women work in the vanilla plantations, where they have as high, or even higher, an incidence of infection. It is therefore

true that the extent of filariasis is dependent on how far the habits and occupations of the people bring them into contact with the appropriate vector mosquito.

VII. F. Hawking's conception of microfilarial periodicity is that there is a passive phase, during which the microfilariae are distributed evenly throughout the blood and therefore appear to be numerous in the peripheral circulation (with *Loa* this occurs during the daytime), and an active phase, during which the microfilariae accumulate in the capillaries of the lungs. This accumulation in the lungs depends upon an active response by the microfilariae to some stimulus provided by the 24-hour rhythmical variations in the physiology of the host. During previous attempts to identify this stimulus, it had been found that other species of microfilariae were sensitive to increase or decrease of the oxygen pressure and to similar physiological changes. Thus the microfilariae of *W. bancrofti* can be caused to leave the blood at night by raising the oxygen pressure (McFadzean), by hyperventilation, or by exercise, while several species of *Dirofilaria* respond differently. In the case of *Loa loa*, the microfilariae were not affected by raising or lowering the oxygen pressure, by breathing carbon dioxide, or by hyperventilation. Exercise often caused a slight diminution in the microfilaria count, but it is doubtful whether this is significant. In a single case, the administration of a general anaesthetic (chloroform) caused a fall in the count by 45 per cent. of its normal maximum value; this *fall* in the count of a diurnal microfilaria is interesting since with the nocturnal microfilariae of *Dirofilaria* in dogs and monkeys, anaesthetics cause a *rise* in the count. The intravenous injection of insulin (by day) causes a fall in the count of 30–60 per cent. of the maximum value, but the fall might continue after the hypoglycaemia had been rectified; the oral administration of glucose during the night did not cause a reverse change, *i.e.*, a rise in the count. It does not seem possible at present to identify the stimuli responsible for microfilarial periodicity. The intravenous administration of diethylcarbamazine (Hetrazan) causes a very rapid irreversible lowering of the count of *Loa* microfilariae; 50 per cent. of the microfilariae in the blood disappear within 2 minutes, and many more within half an hour. This is similar to the effect of diethylcarbamazine upon many other kinds of microfilariae.

VIII. W. E. Kershaw's opinions regarding the epidemiology of infections with *L. loa* may be summarized by the following quotations from his paper.

"It is believed that the complicated and multiple host-parasite-vector complex involving *L. loa*, man and several species of monkeys and several species of *Chrysops*, is confined to the tropical rain-forest of West and Central Africa. It is possible that the parasite has been established longer in monkeys than in man, but it would appear that the complex is now in stable equilibrium with its environment at saturation at a high level of incidence and intensity (a climax) in man in small villages in the intact tropical rain-forest in which live canopy-dwelling monkeys.

"It is evident from an empirical approach to the reactions of the parasitic complex as reflected by the differences in incidence of infection in man in different vegetative zones [the rain-forest, the abrupt forest-fringe, the gradual transition zone, the mountain grassland, the mangrove forest and the coastal vegetation], and in the changes produced by village and town evolution [the effect of an increase of population and of urbanization] and by plantation development [*i.e.*, rubber and palm-oil estates], that the parasitic complex is very sensitive to changes in its environment."

In an analytical approach which includes the quantitative aspects of transmission, consideration is given to the difficulties in understanding such a vector-borne helminth infection, the relation between the human and monkey infection, the effective reservoir in rain-forest villages, the intake of microfilariae by *Chrysops silacea*, the survival of *L. loa* in *C. silacea*, and the survival of the vector *Chrysops*. "It is not possible by an analytical approach to build up a comprehensive mathematical model for this infection at present, since we are ignorant of many of the fundamental principles involved in the transfer of vector-borne helminth infections, and because of the added complications concerning the possible part played by the monkey reservoir and the multiplicity of actual and potential vectors for the transmission of the infection." [In the commentary on his paper, Dr. Kershaw made it clear that he agreed with Professor MACDONALD that these difficulties should not deter an attempt to construct a mathematical model. As Professor Macdonald points out in the discussion, "These [models] are not intended for the demonstration of fully understood happenings, but are scientific tools of great value in experimentation and research. A model shows how epidemiological characteristics would interlock if all the assumptions on which it is made were correct. Comparisons of such models with nature shows which of the assumptions are finally acceptable and which to be rejected. The fact that there is some uncertainty about an aspect of the epidemiology is a good reason for constructing mathematical models based on the alternative hypotheses, to see which corresponds with nature, and not a reason for deferment until the whole story is understood".]

At the discussion which followed the reading of the papers Sir George MCROBERT suggested that whereas the helminthological and entomological aspects of loiasis had been fully discussed, very little attention had been paid to the clinical aspects. It is known that obvious Calabar swellings are produced at the surface of the body: may not similar, although not visible, swellings occur in the deeper tissues and may not these be responsible for some of the nerve palsies which have been recorded in association with loiasis?

Dr. D. S. BERTRAM pointed out that whereas there appeared to be good evidence that human loiasis was transmissible to monkeys, similar evidence was lacking regarding the transmission of monkey loiasis to man. Monkey loiasis showed a tendency to nocturnal periodicity, and it would be of interest to know whether any human cases in the area showed a similar tendency. Dr. Bertram's own work with *L. carinii* in cotton-rats had shown that the density of microfilariae in the blood of rats constantly exposed to infection showed a different pattern to that observed in the blood of rats intermittently exposed. This latter pattern was in accordance with the "state of natural climax" described by Dr. Kershaw as occurring in persons intermittently exposed to the bites of infective *Chrysops*. Professor Gordon had discussed how to explain the presence of hyperendemic loiasis areas of persons with negative blood findings. Such findings were common to all filarial infections and it might be that the adult worms were so closely localized as to interfere with their mutual growth to maturity. He thought it should be possible to gain more information by following up the subsequent history of individuals who were known to have a high concentration of microfilariae.

Professor A. W. WOODRUFF agreed with Professor Gordon that the clinical diagnosis of loiasis was often made on insufficient evidence and he emphasized the need for further investigation of serological methods for the diagnosis of filarial infections, particularly as regards intradermal and complement-fixation tests. He disagreed with Gordon's statement that

" although banocide or hetrazan always causes the disappearance, or a marked reduction in the number, of the microfilariae and kills the adult worms in recently acquired infections, no drug at present available can be guaranteed to eradicate a long-established infection of *L. loa* ". It was his opinion that if the possibility of re-infection were excluded one could guarantee a cure to a patient suffering from loiasis, no matter how long the infection had been present.

Professor G. Macdonald complimented Dr. Kershaw and his colleagues on having thrown fresh light on existing ideas about the measurement of insect transmission. The uniformity and consistency of the results they had presented regarding the mortality pattern of infected and uninfected *Chrysops* put their conclusions beyond reasonable doubt.

Sir William McArthur discussed the several names now in current use for the infection caused by *L. loa* and gave cogent reasons for retaining the term loiasis.

Professor Gordon thanked those present for their kind reception of the papers which had been presented. He was in agreement with Professor Woodruff's emphasis on the need for further research on suitable antigens for the diagnosis of filariasis, although he thought it might be difficult to find antigens sufficiently sensitive to distinguish between the different species of filariae. Professor Woodruff's belief that even the most long-standing cases of loiasis could be cured by Hetrazan (diethylcarbamazine) was founded on the follow-up of a large number of cases, whereas his, Gordon's, belief in its failure was founded on only a few. He agreed with Sir George McRobert that the Symposium had been devoted almost exclusively to the parasite and the vector with scant reference to the disease, but it should be remembered that little progress had been made in the reduction of other such insect-borne diseases as malaria and yellow fever until the parasitologists and entomologists had got busy. *R. M. Gordon*

Duke, B. O. L. **Studies on the Biting Habits of *Chrysops*. I.—The Biting-Cycle of *Chrysops silacea* at Various Heights above the Ground in the Rain-Forest at Kumba, British Cameroons.** *Ann. Trop. Med. & Parasit.* 1955, June, v. 49, No. 2, 193–202, 5 figs.

This paper describes results obtained by systematic catches of *Chrysops silacea* in tree-platforms in virgin forest within half a mile of Kumba in the British Cameroons. The platforms were at 130 ft. (in the top branches of a large tree protruding 20–30 ft. above the main forest canopy), 92 ft. (in the well-shaded canopy of the forest), 28 ft. (between the forest canopy and the main undershrubs, and, therefore, relatively open), and on the forest floor (among the undershrubs and saplings which obscure visibility at ground level). Notable refinements of method are that each platform was sited in a different tree, although all were within a 100 yard length of the same forested gulley, and only one boy at a time occupied each site. These points are thought to be worthwhile in minimizing artificial deviation of flies from one level to another which might have been a difficult practical error with all platforms on one tree and excessive attraction on each owing to movements of several boys.

Catches were made from 7 a.m. to 7 p.m. between March 27th and June 9th 1954, a season when rain falls mainly after fly activity ceases and sunlight and fly catches are usually good. Catches were recorded for each hour and records also were made of dry and wet bulb thermometer readings. Light recordings, less frequent, were by a Weston " Master " photometer coupled with a classification of sky conditions by the universal photographic

scale of Clear Sun, Hazy Sun, Cloudy Bright and Cloudy Dull. The limitations of such concepts are appreciated.

A paper to follow will demonstrate a marked increase in fly catches and change in their biting cycle if wood fire smoke occurs. In the present work, great care was taken to prevent this effect, neither fires nor smoking being permitted.

A total of 420 *C. silacea* were taken in 29 rainless days and the results are abstracted below. Comparatively few flies were taken above the main canopy (130 ft. platform) and biting there seemed randomly distributed from 8 a.m. to 5 p.m. It is suggested that the conditions of extreme temperature, saturation deficiency and light intensity as well as paucity of resting places render this level unattractive to questing hungry females. Those taken may merely be the few abnormally attracted by the platform and the bait boy.

In the true forest canopy (92 feet) biting became marked between 9 a.m. and 10 a.m. but not until after 12 noon or later at the two lower levels. But at the end of the day, despite light intensities as high as in the morning hours before biting is appreciable, the biting persists at a high rate. Indeed, sunset really marks the main fall away in inactivity; persistence of a high biting rate until near darkness is most noticeable in the canopy. It seems probable that particular conditions of temperature and saturation deficiency control activity and that these conditions exist in the canopy earlier in the morning and later in the evening than in the under canopy and ground level sites. Another feature shown is a temporary fall in biting activity in the canopy from 12 noon to 2 p.m. It is partly, but not wholly, explicable by migration of flies from the canopy to the 28 ft. level—which then begins to show a rising biting-rate. It may also be the case that the morning peak of flies biting at canopy level is of flies which were at rest there, while the afternoon peak is of flies resting in the morning on the shrubs and saplings at ground level and being activated to fly up and feed when, later in the day, conditions stimulate them to feed.

The only way of testing the possible existence of two such populations was to study infection rates for *Loa loa* in flies taken at all four levels. Infection rates were 3·6 per cent. infected at 130 ft., 4·1 per cent. at 92 ft., 8·0 per cent. at 28 ft. and 6·9 per cent. at ground level. The author emphasizes that the numbers dissected are rather small, *viz.*, 28, 169, 151 and 72, respectively. Even so, it may be that flies at lower levels are mainly older ones which have come in, perhaps from egg-laying in the gulley streams, and that at the canopy and higher there are many newly emerged flies possibly biting for the first time after fertilization. [See also this *Bulletin*, 1951, v. 48, 907; 1954, v. 51, 1084.] *D. S. Bertram*

Kershaw, W. E., Beesley, W. N. & Crewe, W. **Studies on the Intake of Microfilariae by their Insect Vectors, their Survival, and their Effect on the Survival of their Vectors. VI.—Further Observations on the Intake of the Microfilariae of** *Loa loa* **and** *Acanthocheilonema perstans* **by** *Chrysops silacea* **in Laboratory Conditions: the Pattern of the Intake of a Group of Flies.** *Ann. Trop. Med. & Parasit.* 1955, Mar., v. 49, No. 1, 114–20, 4 figs.

In a previous paper [this *Bulletin*, 1954, v. 51, 963], it is concluded that one cannot be certain of the number of microfilariae a single *Chrysops* fly ingests, even if the amount of blood taken up is known as well as the density of microfilariae in the blood of the person on whom it has fed. It is now shown that, although the intake of the individual fly cannot be

certainly estimated, there is a logical relationship between the actual and expected intakes by the flies and the density of microfilariae in the blood of the infected person if one compares such numerical facts for a group of flies. By mathematical treatment, expressed in graphs, it may be seen that for *Loa loa*, the intake of microfilariae by a group of flies is about half what would be expected from the numbers of microfilariae in the blood of the host; with *Dipetalonema perstans*, actual intake more closely agrees with what would be expected from the microfilarial density of the host's blood.

D. S. Bertram

See also p. 1152, Rageau *et al.*, Tabanidae du Cameroun français. [**Tabanids of the French Cameroons**]

Cambournac, F. J. C., Gândara, A. F. & Pena, A. J. Inquérito sobre oncocercose em Angola. A.—Estudo realizado nas zonas de Catabola (Nova Sintra) e Camacupa (Vila General Machado). [**Onchocerciasis in Angola. A. A Study carried out in Catabola (Nova Sintra) and Camacupa (Vila General Machado)**] *Anais Inst. Med. Trop.* Lisbon. 1955, Mar.–June, v. 12, Nos. 1/2, 5–23, 3 maps. English summary (8 lines).

Onchocerciasis was first reported in Angola by Leite *et al.* (*Anais do Instituto de Medicina Tropical*, 1947, v. 4, 25), and later by Strangway and Strangway (*Jornal do Médico*, 1950, v. 16, 401, 467). In August and September 1953 the present authors examined 1047 Africans in 26 villages in the middle of the country. A clinical examination was made to detect ocular changes (such as conjunctivitis, keratitis and blindness), skin nodules or other abnormalities, and elephantiasis. Skin or conjunctival biopsy was performed and the specimens were examined for microfilariae.

The results showed a considerable incidence of the disease:— 43 per cent. showed suspicious clinical signs; the Mazzotti test was positive in 54 per cent. [In the Mazzotti test a dose of diethylcarbamazine is given in the evening, and in onchocerciasis this is often followed in a few hours by allergic phenomena and especially by pruritus. See also Burch, this *Bulletin*, 1952, v. 49, 170.] Ocular changes were found in 11·4 per cent. (blindness in 6 per cent.), microfilariae were found in the conjunctivae of 12 of 25 persons with conjunctivitis, 22 of 38 with keratitis, and 24 of 64 who were blind. Skin manifestations were present in 402 (38 per cent.) but nodules in only 31 (3 per cent.); glandular enlargement was found in 30 and elephantiasis in 13. In all, microfilariae were detected in 32 per cent. The authors give an account of the pathological findings in nodules, skin and glands.

Attempts were made to collect *Simulium damnosum* (the only species found, and apparently the vector) along various rivers. Several hundred adults were caught and dissected, and larval filariae in various stages were found in 32 per cent.

Charles Wilcocks

Leite, A. S., Janz, G. J., Gândara, A. F., Ré, L., Casaca, V. & de Carvalho, A. M. Relatório da Missão do Instituto de Medicina Tropical a Angola (1954) em colaboração com a Missão de Prospecção de Endemias em Angola. [**Report of the Mission of the Institute of Tropical Medicine to Angola (1954) in Collaboration with the Mission for Endemic Diseases of Angola**] *Anais Inst. Med. Trop.* Lisbon. 1955, Mar.–June, v. 12, Nos. 1/2, 219–54, 6 maps & 51 figs. on 27 pls.

Although in this survey, which was undertaken from July to September 1954, investigations were made on several diseases, the major part of the

work was done on onchocerciasis. In the first phase examinations of blood were made; of 249 persons examined for the sickle-cell trait none was positive; blood groups were determined for these people. A few cases of tinea were observed.

In the second phase of the work in August and September 1954, examinations were made of 1,000 persons in the region of Vila Salazar; children under 5 years were not included in this group. Of these 1,000 persons 57·4 per cent. were positive for microfilariae in the skin. The chief symptom was pruritus, and nodules were found in 5·1 per cent. A few patients were found with cutaneous lesions, and still fewer with elephantiasis. Visual disturbances were present in 14·9 per cent., but many of them may not have been the result of onchocerciasis—the symptoms included diminution of visual acuity, perception of microfilariae in the eye by the patient, and photophobia. These visual abnormalities were found in 27·7 per cent. of those with microfilariae in the skin, but also in 7 per cent. of those without microfilariae.

A comparison showed that for demonstration of microfilariae in the skin, the method of scarification sometimes gave positive results when skin biopsy was negative, though more often the reverse was the case. The Mazzotti test was positive in 76·3 per cent. of persons who showed microfilariae, and negative in 23·7 per cent.

Studies were made on species of *Simulium* in the province of Portuguese Congo. Pupae and adults were collected and examined, and 11 species were identified, one being *S. damnosum*. The authors captured and dissected 227 female *S. damnosum*, finding larval filariae in 24 (10·5 per cent.). A search was made for larvae or pupae of *S. neavei* on crabs, but none was found.

The paper is illustrated by a series of maps, and photographs of lesions and of microscopic preparations of the adult filariae, and of the countryside in which *Simulium* breeds. *Charles Wilcocks*

Nettel F., R. Estudio referente a las dimensiones de la microfilaria *Onchocerca volvulus*. [**Study of the Dimensions of the Microfilaria of** *Onchocerca volvulus*] *Medicina*. Mexico. 1955, June 10, v. 35, No. 725, 241–9, 8 figs. [23 refs.]

The following is a translation of the author's summary:—

The author reports a study of a revision of the problem of the dimensions of the microfilaria of *Onchocerca volvulus* and concludes that varying sizes may be met with according to the origin of the material examined.

Free intra-uterine microfilariae and those found in nodular tissue are in general of medium size, varying slightly in length and thickness. Microfilariae from the skin of untreated patients have an average length of 247·8 μ and average breadth of 5·63 μ. Those which remain in the skin of patients treated with various drugs are 240·7 and 6·41 μ in length and breadth respectively, and are apparently of the type of embryos considered to be "short and thick". These observations have suggested a study of the structure of filarial embryos in their distinctive stages, a study which is being undertaken with the same material and which, it is hoped, will throw more light on the problem. *H. J. O'D. Burke-Gaffney*

Crosskey, R. W. **Observations on the Bionomics of Adult** *Simulium damnosum* **Theobald (Diptera, Simuliidae) in Northern Nigeria.** *Ann. Trop. Med. & Parasit.* 1955, June, v. 49, No. 2, 142–53, 4 figs. [12 refs.]

In Northern Nigeria *Simulium damnosum* is markedly anthropophilic in its feeding habits, although it was noticed feeding on donkeys and dogs.

Long hair affords some protection against the fly. The insect bites predominantly upon the lower extremities in man.

Simulium damnosum bites throughout the day from 7 a.m. to 6.30 p.m., the frequency of biting increasing gradually through the morning and declining in the afternoon with little or no mid-day depression.

The fly bites anywhere out of doors and occasionally inside houses. It will attack on rocky or grass-covered hills several hundred feet above the breeding grounds. Adult flies tend to be few where riverine vegetation is absent. Where it is thick the insect will not bite in the forest itself, but only in open grassy places, particularly along the edge of the dense vegetation.

In Northern Nigeria the dry season begins in October or the first week in November and lasts from 5 to 5½ months. During the dry season many rivers may dry up completely or contract to chains of stagnant pools. *Simulium damnosum*, however, survives in the larger rivers which just keep flowing until the rains arrive. The fly population rises rapidly during May and June, falling again by August when the rivers are in deep flood and breeding is temporarily reduced. River levels fall in September and a second peak in the adult population is reached.

There is an increase in the number of flies captured on days following heavy rain and river flooding. The density of flies is generally moderate in Northern Nigeria being about 10–30 flyboy hours. Flies were caught up to 7 miles from breeding rapids in densities of up to 3 flyboy hours.

[See also this *Bulletin*, 1954, v. 51, 1085; 1955, v. 52, 68.] *G. Crisp*

See also p. 1116, Burch, **Treatment of Wuchereriasis and Onchocerciasis with Suramin Sodium.**

Lea, A. O., Jr. & Dalmat, H. T. **Field Studies on Larval Control of Black Flies in Guatemala.** *J. Econom. Entom.* 1955, June, v. 48, No. 3, 274–8, 2 figs. [11 refs.]

The important anthropophilic blackflies and vectors of onchocerciasis in Guatemala, *Simulium ochraceum*, *S. metallicum*, and *S. callidum*, breed in all sizes of stream from those with flows of only 10 gallons to those running at 100,000 gallons per minute. The purpose of this work was to determine the most suitable dosages of DDT for the various types and size of stream or river. The nature of the streams, methods of application and assessment of results are fully described with some photographs, a table and chart. The authors' summary is given below:—

"In Guatemala, investigations of onchocerciasis included studies of black fly control by larviciding streams. The breeding streams in the region of the laboratory were grouped by volume as follows: (1) rivulets, 10 to 100 gallons per minute; (2) intermediate streams, 100 to 1,000 gallons per minute; (3) large streams, 1,000 gallons per minute and up. In all, several hundred treatments were made in streams of each group to ascertain the most economical combination of treatment time and concentration for DDT and other insecticides, as determined by the distance in the stream which was completely cleared of larvae.

"Tests were made to determine the relationship of insecticide material, concentration, application period, and stream volume to the distance of kill attainable with one treatment. It was found that for DDT at the rates of 0·1 p.p.m. for 3 minutes, 0·1 p.p.m. for 60 minutes, and 2 p.p.m. for 3 minutes, the greater the stream-volume at the point of treatment the farther

the insecticide would be effective in a stream. However, DDT at 0·1 p.p.m. for 3 minutes, which was effective for about 2 miles at a volume of 5,000 gallons per minute, appeared to have reached the limit of its effectiveness at that volume, for beyond it, the distance of kill showed relatively little increase. Such a limit to the effective distance of control was never attained with DDT at the 0·1 p.p.m. concentration applied over a 1-hour period, the largest river so treated having a volume of 90,000 gallons per minute.

" In any future larviciding program treatment with 0·1 p.p.m. DDT for 3 minutes in the short rivulets and most intermediate size streams, which constitute 90% of the breeding streams in the area, would make possible important savings in man-hours spent in making the applications as well as reducing the amount of material which would have to be transported in the field over rugged terrain. In streams over 5,000 gallons per minute either 2·0 p.p.m. DDT for 3 minutes or 0·1 p.p.m. for 60 minutes should be used.

" Of the many other insecticides tested, EPN and heptachlor gave control similar to that with DDT only in streams of less than 500 gallons per minute. Either of these compounds could be used to advantage in the smaller streams, while DDT could be reserved for the larger streams." *D. S. Bertram*

Fain, A. Le genre *Gongylonema* Molin 1857, au Congo belge et au Ruanda-Urundi. [**The Genus *Gongylonema* Molin, 1857 in the Belgian Congo and Ruanda Urundi**] *Ann. Parasit. Humaine et Comparée.* 1955, v. 30, No. 3, 202–18, 7 figs. [17 refs.]

Prijyanonda, B., Pradatsundarasar, A. & Viranuvatti, V. **Pulmonary Gnathostomiasis. A Case Report.** *Ann. Trop. Med. & Parasit.* 1955, June, v. 49, No. 2, 121–2, 3 figs. on pl. [11 refs.]

A Thai girl of 15, after suffering from a dry cough for a week, expelled a small whitish worm during coughing. X-ray examination next day showed partial consolidation of the lower lobe of the left lung. There was an eosinophilia of 72 per cent. Two days later the pulmonary consolidation had cleared completely. The worm (which is shown in a photograph) was identified as *Gnathostoma spinigerum*. [For previous cases reported by workers in Thailand, see this *Bulletin*, 1934, v. 31, 801; 1940, v. 37, 307; 1949, v. 46, 1069.] *H. J. O'D. Burke-Gaffney*

Otto, G. F., Berthrong, M., Appleby, R. E., Rawlins, J. C. & Wilbur, O. **Eosinophilia and Hepatomegaly due to *Capillaria hepatica* Infection.** *Bull. Johns Hopkins Hosp.* 1954, June, v. 94, No. 6, 319–36, 12 figs. [12 refs.]

Two cases of true *Capillaria hepatica* infection of man have previously been reported [this *Bulletin*, 1924, v. 21, 963; 1951, v. 48, 183], but both were diagnosed at post-mortem examination. The authors now record the first case to be diagnosed during life. The patient was a young coloured girl in rural North Carolina who was a subject of sickle-cell anaemia. The illness which led to the diagnosis of *Capillaria* infection began with epistaxis, fever, vomiting of clotted blood, pain in the head, neck, chest and abdomen, and dyspnoea. In hospital the disease was obscure; she passed an adult *Ascaris*, but after treatment with hexylresorcinol no helminth eggs could be found. The liver became progressively enlarged and there was ascites due to thick gelatinous fluid. Laparotomy and biopsy of the liver on two occasions

relieved the symptoms and revealed masses of *Capillaria* eggs, and on the first occasion adult worms in necrotic areas. There was eosinophilia up to 30,000 per cmm., and eosinophils were found in the liver lesions. The liver became enormous.

Treatment was attempted with chloroquine on the ground that this drug is heavily deposited in the liver and is active against some worms, but this was ineffective. The child died about 2 years after the onset of the acute illness which was thought to mark the parasitic invasion. The liver was filled with dense bands of fibrous tissue, which contained eosinophils and large numbers of eggs of *Capillaria* in giant cells. Many of the eggs appeared normal, but there were no signs of maturation. Occasional shadowy remnants of dead adult worms were also found.

C. hepatica is commonly a parasite of rats, and although the statement has been made that the infection is transmitted when rats eat the egg-laden livers of infected rats, Luttermoser (*Amer. J. Hyg.*, 1936, v. 24, 350; 1938, v. 27, 275, 321) has been unable to find embryonated eggs in such livers (a finding which is supported by the present case), and suggests that when a rat eats an infected liver the eggs are freed from the liver tissue in the intestine and are passed in the faeces, to mature perhaps on moist soil or in aerated water and thence to be swallowed in embryonated form by another animal. But in the human case now reported the origin of what must have been enormous doses of eggs within a short space of time remains a mystery.

Charles Wilcocks

Malewitz, T. D. & Lysenko, M. G. **Incidence of *Enterobius vermicularis* in 535 Puerto Rican Children.** [Research Notes.] *J. Parasitology.* 1955, June, v. 41, No. 3, 330–31.

The authors refer to findings of *Enterobius* in children in Puerto Rico by Jeffery [this *Bulletin*, 1951, v. 48, 184] and Brady (*Proc. Helminth. Soc. Washington*, 1941, v. 8, 10). In this larger survey, they studied 535 Puerto Rican children aged 1 to 14 years at a paediatric out-patient clinic. All came from poor families living in or near slum areas. The Scotch tape method was used for examination.

The results are shown in a table, in sex and age groups. The incidence of *Enterobius* infection was 6·0 per cent., was slightly higher in females and commonest in those aged 3 to 4 years. It is noted that Mazzotti in tropical Mexico [this *Bulletin*, 1945, v. 42, (926)] observed the highest incidence in children of 6 and 7.

Ascaris (16·8 per cent.) and *Trichuris* (15·9) eggs were also found. There were 7·2 per cent. multiple infections. *H. J. O'D. Burke-Gaffney*

Bonelli, Virginia D. Incidencia de *Enterobius vermicularis* en el apéndice vermiforme de niños. [**Incidence of *E. vermicularis* in the Appendix of Children**] *Semana Méd.* 1955, May 26, v. 106, No. 21, 735–6, 756. [10 refs.]

The English summary appended to the paper is as follows:—

"The appendicular contents of 130 appendices of children under 14 years old have been examined, and 33 cases of oxyurosis were discovered: in 12 of these cases the *E. vermicularis* was found associated with other parasites. This quantity represents a proportion of 25·38%; 25·46% corresponding to girls and 23·53% to boys.

"Sex does not seem to have great influence on this parasitosis but it has

been proved once again that a greater frequency is to be found between 7 and 10 years old.

"There is also a 21·54% of the appendices examined whose contents reveal the presence of cysts and eggs of other parasites. From this one must deduce that approximately 47% of the children attacked by appendicitis suffer also parasitosis."

Ricci, M. & Corbo, S. Sull'azione dell'idrato di piperazina verso *Enterobius vermicularis*. [**Action of Piperazine Hydrate on** *Enterobius*] *Riv. di Parassit.* Rome. 1955, Apr., v. 16, No. 2, 73–82. [23 refs.]

The English summary appended to the paper is as follows:—

"175 children of 2–12 years of age, parasitized by *E. vermicularis*, have been treated with mg/kg *pro die* of piperazine hydrate during 21 consecutive days, or during 14 consecutive days, or during 14 days consisting of 7 days' treatment, 7 days' rest, followed by another 7 days of therapy. The *pro die* dose has been administered two or three times to three groups of children: at home, at school, and partly at home and partly at school.

"The 95% of 140 subjects, to whom the drug had been regularly administered and who had been kept under careful observation, showed to be completely cured. The treatment, lasting 14 consecutive days, appeared to be as reliable (96·83% of cured cases) as the one lasting 21 days (96·92%) but more efficient than the one lasting 14 days divided into 2 cycles (83·33%).

"No action was shown by piperazine hydrate on *E. coli*, *I. bütschlii*, *G. intestinalis*, *H. nana* and *T. trichiura*. However, 4 cases of ascaridiasis recovered completely.

"In no case were observed toxic effects."

See also p. 1108, Brumpt & Ho-Thi-Sang, Traitement de l'ascaridiose et de l'oxyurose par les dérivés de la pipérazine. [**Treatment of Ascariasis and Enterobiasis with Derivatives of Piperazine**]

Harant, H., Castel, P. & Gras, G. Traitement de l'oxyurose par la tétracycline. [**Treatment of Enterobiasis with Tetracycline**] *Bull. Soc. Path. Exot.* 1954, v. 47, No. 6, 822–5.

Earlier workers quoted by the authors have stated that bacitracin, aureomycin and oxytetracycline have an effect on *Enterobius* and the authors tested the effects of tetracycline, which is more stable and better tolerated than oxytetracycline is.

In 10 tests on faecal cultures of *Rhabditis macrocerca* a 3 per cent. solution of tetracycline hydrochloride killed these nematodes in an average time of 3 hours, 25 minutes. Deschiens [this *Bulletin*, 1946, v. 43, (352)] using trephenylmethane dyes considered that this test is positive if the worms die in less than 48 hours and Valette *et al.* (*Ann. Pharm. Franç.*, 1953, v. 11, 649), using vegetable extracts with a direct toxic action, killed these nematodes in 5–15 minutes.

The authors then tested tetracycline on *Syphacia obvelata* and *Aspiculuris tetraptera* parasitic in white mice. One group of 10 mice were treated with 1 cc. of the 3 per cent. solution of tetracycline hydrochloride for 8 days; a second group acted as controls. On the 9th day all the mice were killed and 2 only of the treated group were still infected, while all the controls were infected. This represents an efficacy of 80 per cent.

Three human patients were also treated. All three had been previously treated with various drugs, including gentian violet, and piperazine derivatives. One patient aged 32 received 1 gm. daily of tetracycline for 15 days without toxic effects and there was, for 6 days, a massive expulsion of worms, but the worms were, at the end of treatment, small. The same treatment was given to a patient aged 29. The third patient, aged 8, was given 0·5 gm. of tetracycline for 15 days. The authors state that sticky-paper swabs showed that all 3 patients were " deparasitized ", but no details of the tests applied are given.

The authors conclude that tetracycline has a powerful action on oxyurid nematodes. A dose of 150 mgm./kgm. body weight given to mice reduced the worm burden by 80 per cent. and a dose of only 17 mgm./kgm. given to human patients reduced it by 100 per cent. Other workers quoted by the authors have obtained a reduction of 85 per cent. with aureomycin and nearly 100 per cent. with oxytetracycline. But tetracycline is much better tolerated by the alimentary canal. Its mode of action on nematodes is not known, but it seems to alter the bacterial flora of the intestine so that the nematodes cannot live in this situation and it may have a direct toxic action. [See also this *Bulletin*, 1952, v. 49, 1067.] *G. Lapage*

Richels, I. Histologische Studien zu den Problemen der Zellkonstanz: Untersuchungen zur mikroskopischen Anatomie im Lebenszyklus von *Trichinella spiralis*. [**Histological Studies on the Problem of Cell Constancy. Observations on Microscopic Anatomy in the Course of the Life-Cycle of** *Trichinella spiralis*] *Zent. f. Bakt.* I. Abt. Orig. 1955, v. 163, No. 1, 46–84, 62 figs. [52 refs.]

DEFICIENCY DISEASES

Floch, H. & Gélard, A. Etablissements de standards alimentaires adaptés aux conditions spéciales de notre Département guyanais. [**The Establishment of Dietary Standards adapted to the Special Conditions of French Guiana**] *Arch. Inst. Pasteur de la Guyane Française. Publication No. 347.* 1954, Dec., 16 pp.

The authors give a series of tables of caloric, mineral, and vitamin requirements, according to age.

Someswara Rao, K., Ramanathan, M. K., Taskar, A. D. & Phansalkar, S. V. **The Failure of Vitamin B_{12} to promote Growth in Undernourished Indian Children.** *Indian J. Med. Res.* 1955, Apr., v. 43, No. 2, 277–83. [19 refs.]

" Daily administration of an oral supplement of 20 μg. to 25 μg. of vitamin B_{12} for a period of 14 to 15 weeks to undernourished Indian children subsisting on restricted or adequate vegetarian diets produced no demonstrable effect on the growth of these children. Nitrogen retention also remained unaffected since vitamin B_{12} failed to influence the digestibility and apparently also the utilization of dietary protein in these children."

Dufour, G. & Dufour, Y. Observations sur la croissance des nourrissons et sur quelques aspects de carence alimentaire à la Réunion. [**Observations on the Growth of Infants and on Some Aspects of Dietary Deficiency at Réunion**] *Méd. Trop.* Marseilles. 1954, Nov.–Dec., v. 14, No. 6, 741–8, 7 figs. on folding pl.

On the island of Réunion birth rates, infant mortality rates and death rates in children under 5 years are all high. The weight of babies at birth is low, especially in the months from May to August when the food available to the poor mothers is at a minimum. Most children are weaned by 8 months, and thereafter growth rates are frequently very slow. Deficiency diseases are common, notably kwashiorkor. In the children of African race the severe forms are seldom seen, but in white children and those of mixed race the condition is always more grave. Kwashiorkor, however, does not seem to lead to cirrhosis of the liver in adults. Deficiency diseases have a well-marked seasonal incidence, and are not as chronic as they are reported in Africa. *R. Passmore*

Charmot, G. L'étiologie des cirrhoses africaines. [**The Aetiology of Cirrhosis of the Liver in Africans**] *Méd. Trop.* Marseilles. 1954, Nov.–Dec., v. 14, No. 6, 689–702. [63 refs.]

This is a good account of the disease based on clinical observations in Dakar. There is a most useful bibliography containing important papers in French and some key English references. Cirrhosis of the liver in Africans resembles the classical cirrhosis described by Laennec, except that the disease is most common in young adults and that alcoholism is seldom, if ever, a cause. The fundamental cause is an existence which is filled with ignorance, misery, malnutrition, the absence of food and hygiene, and with a multitude of parasites. The importance of chronic malarial infections in children is discussed. These may lead to a reticulo-fibrosis of the liver, but it is doubtful if they are responsible for cirrhosis. Schistosomiasis can undoubtedly give rise to cirrhosis, but it is uncertain how often this occurs. Frequent gastro-intestinal infections disturbing digestion and absorption may be contributory. Chronic inflammatory processes in the liver, of an unknown nature and not associated with jaundice, may progress slowly into cirrhosis. Fatty infiltration is not an essential stage in this evolution and indeed it is not common in young adults. Fatty livers are common in young children and probably of nutritional origin, and cirrhosis is habitually associated with such infiltrations. The general conclusion would appear to be that cirrhosis arises from the onslaught of a variety of infections, some identified, some unknown, upon livers damaged by inadequate diets since the time of weaning. *R. Passmore*

HAEMATOLOGY

Foy, H., Kondi, Athena & Sarma, B. **Anaemia in the Tropics.** [Correspondence.] *Brit. Med. J.* 1955, Aug. 6, 376–7.

The authors refer to the Goulstonian lectures by Professor A. W. Woodruff [this *Bulletin*, 1955, v. 52, 818] in which he deals with anaemia associated with protein malnutrition as seen by him in Nigeria. The subjects had mainly been pregnant women but there had also been a group of

infants suffering from kwashiorkor and a group of adults in whom the predominant feature was a severe damage to the liver. Writing from Assam, India, the present authors state that in the Brahmaputra valley anaemia was very different from that described by Professor Woodruff. There was no liver involvement and little splenomegaly. In 54 out of 55 the red cells were microcytic hypochromic iron deficient with MCV between 45 μ^3 and 80 μ^3 with MCH and MCHC between 12 $\gamma\gamma$ and 20 $\gamma\gamma$ and 18 per cent. to 22 per cent., respectively. The majority of anaemias responded to iron. The authors are doubtful whether nutrition is an important factor in the genesis of these anaemias and they point out that when iron deficiency anaemia is found in the tropics there seems to be as a common denominator a climate of abundant heat and humidity. It seems that iron loss through excessive perspiration may be the most important cause of this anaemia.

[As up to now one would have thought that the hookworm was the most important factor in causing iron deficiency anaemia in hot and humid regions, it is to be hoped that in the full publication of these data, cogent reasons will be given by the authors why excessive sweating rather than intestinal parasites should cause these iron deficiency anaemias. They " agree with Professor Woodruff that intestinal parasites are not likely to be an important factor ", but Professor Woodruff—as the authors state repeatedly—dealt with quite a different type of anaemia.]

H. Lehmann

Stafford, J. L. **The Hereditary Haemolytic Syndromes.** *West Indian Med. J.* 1955, Mar., v. 4, No. 1, 9–24, 8 figs. [51 refs.]

A general review and discussion.

Smith, C. H., Schulman, I., Ando, R. E. & Stern, Gertrude, with the technical assistance of Eleanor Fort & Joyce Prestwidge. **Studies in Mediterranean (Cooley's) Anemia. II. The Suppression of Hematopoiesis by Transfusions.** *Blood.* 1955, July, v. 10, No. 7, 707–17, 5 figs. [14 refs.]

In a previous article [this *Bulletin*, 1955, v. 52, 1015] the authors dealt with the definite though limited value of splenectomy in selected patients with Mediterranean anaemia. With the reduction of transfusions in the post-splenectomy period a rise of the endogenous foetal haemoglobin had been noted. This suggested a release from an inhibitory influence by blood transfusions. This paper reports the effect of blood transfusions on the endogenous erythropoiesis and haemoglobin synthesis of 5 patients with Mediterranean anaemia and one with Mediterranean anaemia and sickle-cell disease (microdrepanocytic disease). By simultaneous determination of haemoglobin concentration and percentage of foetal haemoglobin, total blood volume, total red cell volume, and the survival of transfused erythrocytes it was possible to distinguish between the circulating haemoglobin and red cell volumes of donor and recipient.

Identification of two different bloods is usually based on the differential agglutination of red cells; however, in this study the authors made use of the fact that in Mediterranean anaemia the presence of large amounts of foetal haemoglobin contributes a " natural tag " of the patient's blood, and thus permits another type of differentiation between donor's and recipient's cells. Although this method does not permit determination of the total mass of the recipient's blood, the change in total circulating foetal haemoglobin served as an index representative of the changes in the patient's blood production.

A fall of circulating foetal haemoglobin occurred in the first week after a transfusion, and continued for some time—in one particular case for 7 weeks. This was followed by a sharp increase in circulating foetal haemoglobin—at the stage at which the total circulating haemoglobin had fallen to the initial pre-transfusion level. After this the total circulating haemoglobin fell no further, suggesting that the patient's own blood formation balanced the loss of donor's blood.

The authors suggest that patients with Mediterranean anaemia are regulating their haemoglobin concentrations differently from normal persons. Haemoglobin concentrations which would indicate severe anaemia under ordinary circumstances are, in fact, " normal " for these patients, and elevation of haemoglobin concentration by transfusions, though not approaching the normal range, may constitute " polycythaemia " with inhibition of erythropoiesis for the person adjusted to much lower levels. The authors do not want their observations to detract from the necessity of transfusing these patients but suggest the advisability of occasionally withholding treatment to determine the innate bone-marrow function, particularly after splenectomy.

H. Lehmann

Sturgeon, P., Itano, H. A. & Bergren, W. R. **Genetic and Biochemical Studies of ' Intermediate ' Types of Cooley's Anaemia.** *Brit. J. Haematol.* Oxford. 1955, July, v. 1, No. 3, 264–77, 3 figs. [41 refs.]

" Cooley's anaemia clinically intermediate in severity may be found in an individual heterozygous for the Cooley's gene who has also inherited the gene responsible for the formation of haemoglobin-S, -C or -E.

" Both low and high foetal to adult haemoglobin ratios were found in individuals with a mild anaemia who are apparently homozygous for the thalassaemia gene. It is evident that the severity of the anaemia cannot be correlated with the relative amount of foetal haemoglobin.

" Electrophoretic examination for haemoglobin abnormalities should be included for a complete evaluation of the genetic nature of any atypical Cooley's anaemia. The present work has demonstrated the value of such a procedure in clarifying the bases for some intermediate cases of Cooley's anaemia."

Deliyannis, G. A. & Tavlarakis, N. **Sickling Phenomenon in Northern Greece.** *Brit. Med. J.* 1955, July 30, 299–301, 1 map. [65 refs.]

Several highly inbred groups of Greeks living in Chalkidiki and on the Sithonia and Kassandra Peninsulae as well as on the bordering plains near Salonika, show a high incidence of the sickle-cell trait. The trait is found in patches: some villages may show an incidence of over 30 per cent. and some may show none at all.

H. Lehmann

West Indian Med. J. 1955, Mar., v. 4, No. 1, 25–37, 1 fig. [27 refs.]
Sickle Cell Anaemia. Symposium at the University College of the West Indies, May 26th, 1954 [Cruickshank, E. K., Chairman].

Dr. J. B. Jelliffe gave a definition of sickle-cell anaemia and sickle-cell trait and reported on the incidence of the sickle-cell trait in the different racial groups in Jamaica. In the " average " Jamaican children who are racially mainly African the incidence was 5·7 per cent. None was found in Chinese or Caucasian children. Clinical experience has shown that sickle-cell anaemia patients may show a spontaneous improvement with age. Dr.

H. McD. Forde discussed the differential diagnosis of sickle-cell anaemia and Dr. J. S. R. Golding drew attention to the nature of the bone changes. There seems to be good evidence that sickle-cell disease will predispose patients to osteomyelitis with the death of a large area of bone. Dr. W. R. Cole described the radiological lesions in the chest, the digestive system and the bones. Lastly Professor K. R. Hill, Dr. K. P. Clearkin and Dr. J. S. Garrow discuss the laboratory findings in sickle-cell anaemia and give a survey of 15 laboratory tests showing the differences or similarities in 23 cases of sickle-cell anaemia. There is, of course, anaemia, an increase in white cells and raised resistance to hypotonic haemolysis, but the liver function tests show no gross changes. *H. Lehmann*

Betke, K. & Greinacher, Irmgard. Untersuchungen über biologische und physikalisch-chemische Eigenschaften von Sichelzell-Hämoglobin. [**Examinations on the Biological and Physico-Chemical Properties of Sickle-Cell Haemoglobin**] *Klin. Woch.* 1955, July 1, v. 33, Nos. 25/26, 611–12, 1 fig. [14 refs.]

Oxidation of haemoglobin with different oxidizing agents shows up characteristic differences between the haemoglobins of different mammalian species. It is also possible with this technique to differentiate between foetal and adult haemoglobin of man. When adult haemoglobin was compared with sickle-cell haemoglobin and oxidized with potassium ferricyanide, sodium nitrite and iodine, no differences between the two could be demonstrated. Another way to differentiate between the haemoglobins of various species is to determine how much of them is adsorbed to a given amount of colloidal aluminium hydroxide. Here a considerably stronger adsorption of haemoglobin S than of haemoglobin A could be demonstrated. In addition it was found that sickle-cell haemoglobin, like foetal haemoglobin, is more easily coagulated by heat than adult haemoglobin, and heat denaturation at a given temperature is accelerated in comparison. *H. Lehmann*

Deliyannis, G. A. & Tavlarakis, N. **Compatibility of Sickling with Malaria.** *Brit. Med. J.* 1955, July 30, 301–2. [11 refs.]

The authors had an opportunity of using lists supplied by the Department of Malaria in Northern Greece and were able to examine 136 patients who had recently been reported as suffering from malaria. These patients came from four villages with high sickling rates. In this area 500 unselected persons showed an incidence of 23·6 per cent. for the sickling phenomenon, yet among the 136 malaria patients only 5·8 per cent. were sicklers. Sickle-cell tests were also made on siblings of families affected by malaria and it was noted that there was a negative correlation between malaria infection and the presence of sickling. Among 17 children and adults suffering from malaria only one sickler was found, yet among their 31 siblings 22 were sicklers. *H. Lehmann*

Scott, R. B. & Jenkins, M. E. **Studies in Sickle-Cell Anemia. V. Sickle-Cell Hemoglobin C Disease. (Report of Two Cases in Siblings with Clinical and Genetic Observations and a Brief Review of the Literature.)** *Amer. J. Dis. Children.* 1955, July, v. 90, No. 1, 35–42, 3 figs. [25 refs.]

The object of this paper is to make the American paediatricians familiar with the sickle-cell haemoglobin C disease. A study of two brothers, 12 and

9 years old, with the disease, is presented in detail and there is a number of useful tables. One of them lists the differential diagnoses of the common sickling diseases. Another gives a summary of 19 other cases reported from the United States. *H. Lehmann*

Orvis, H. H., Holly, Pearl B. & Smith, N. E. **Hemoglobin-C Disease.** *Arch. Intern. Med.* 1955, July, v. 96, No. 1, 126–30, 4 figs.

This is an interesting report on a patient with haemoglobin C disease. She was first seen at the George Washington University Hospital in Washington D.C. in April 1948 when she gave a history of fulness in the chest and epigastrium after meals, for about 6 months. She also complained of a dull ache in the left side radiating to the back and mainly associated with eating fatty and fried foods. Some 25 years before there had been occasional aches in various joints and it had been suggested to her that she was suffering from rheumatism; however, there had been no swelling, redness or heat of the involved joints. Eight years before she had had a hysterectomy and, some time after, an episode of jaundice which lasted an unknown period of time. On examination she was found to be a well-developed and well-nourished Negro woman who did not appear to be ill. It was believed that she was suffering from chronic cholecystitis, but no positive evidence was obtained. A diverticulum at the cardia of the stomach was found and it was noted that the spleen was enlarged. The haemoglobin level was 11 gm. per cent.

After these initial visits subsequent ones were sporadic. She returned again from time to time complaining of pain in the shoulders, weakness and easy fatiguability. The fragility of her red cells was diminished, haemolysis beginning at 0·38 per cent. saline and being complete only at 0·2 per cent. On a visit in August 1952 it was noted that the nucleated red blood cells were markedly increased in number and that the normoblasts were small in size, as seen in iron deficiency anaemia. There were also target cells and moderate achromia. In August 1952 an intravenous pyelogram showed an ectopic kidney on the left. In September 1953 she returned again with her original complaints of fulness after eating. Numerous liver-function tests failed to determine anything abnormal, but the bilirubin level was found to be 1·7 mgm. per cent., most of the pigment giving the indirect Van den Bergh reaction. In December 1953 a liver biopsy was done and showed a normal liver.

About this time the combination of splenomegaly, reticulocytosis, hyperbilirubinaemia, increased resistance to hypotonic saline and the number of target cells in the peripheral smear, plus a negative sickling reaction, suggested haemoglobin C disease. This diagnosis was confirmed when paper electrophoresis revealed homozygous haemoglobin C. The patient was discharged and has since then remained relatively free from symptoms, and has continued to work as a domestic servant. Observation over the 6 years has shown that the haematological features have remained quite constant, the haemoglobin level varying from 9 to 12 gm. per cent. and being on the average 11 gm. per cent. There was nothing suggestive of a crisis and this case confirms the general impression that homozygous haemoglobin C disease is a mild, relatively stable haemolytic anaemia. *H. Lehmann*

See also p. 1101, Montestruc & Berdonneau, Étude du test de Thorn sur quelques éosinophilies massives [**The Thorn Test in Massive Eosinophilia**]

VENOMS AND ANTIVENENES

Piantanida, M. & Muić, N. **The Antigenic Composition of Ammodytes Viper Venom.** *J. Immunology.* 1954, Aug., v. 73, No. 2, 115–19, 6 figs.

The antigenic composition of snake venoms is complex. Many venoms are stated to have an antigenic nucleus in common but the group specificity does not always correspond to the zoological classification of snakes; the antiserum of one venom partially neutralizes all the venoms of the same group, but the effect is more complete for venoms containing more of the secondary components in common with the antigen used for immunization. These assumptions have proved valuable for the preparation of polyvalent antisera.

The authors have investigated the composition of the venom of *Vipera ammodytes*, by means of the Oudin test in which solutions of venoms are pipetted on to the surface of a mixture, in a test tube, of equal parts of hyperimmunized horse serum and 0·6 per cent. agar in saline. After about 10 days the tubes are photographed and bands of precipitation are noted.

The venom was dissolved in water and dialysed, and from the crude precipitate various fractions, insoluble in 0·33 or 1·0 per cent. sodium chloride, were separated, and Oudin tests were carried out with these fractions and with the whole venom. Paper-strip chromatograms were also made of the various fractions, and gave an indication of the protein components. The Oudin test indicated the presence of 3 antigenic components, all partially precipitated at low ionic strengths.

Animal experiments with pooled venom indicate that two different toxic substances are present and act separately, one is a neurotoxic substance and the other a haemorrhagic toxin. The venom as a whole kills mice by a strongly neurotoxic action, but the crude precipitate exhibited a predominantly haemorrhagic activity. In the present work, all the precipitated fractions showed significant haemorrhagic, but very moderate haemolytic and neurotoxic activities; the haemolytic and neurotoxic activities are mainly restricted to the soluble portion of the venom. *Charles Wilcocks*

Hentsch, H. F. G. Über die Behandlung von Giftschlangenbissen. [**Treatment of Snake Bite**] *Ztschr. f. Tropenmed. u. Parasit.* Stuttgart. 1955, June, v. 6, No. 2, 252–5, 2 figs.

The English summary appended to the paper is as follows:—

" 112 cases of snake bite were observed in Djawa-Timur (East-Java). Of 44 patients treated with polyvalent antivenin 20 died. The rest of the cases were given high doses of antihistamin compounds (antazoline or tripelenamin hydrochloride) besides the serum treatment. Antihistamin quickly reduced the edema and hyperemia of the bitten region, it also acted as a sedative and stayed vomiting and dizziness. Of 68 patients treated with antivenin and antihistamin combined only 13 died."

Maržan, B. **Pathologic Reactions associated with Bite of** *Latrodectus tredecimguttatus.* **Observations in Experimental Animals.** *Arch. Pathology.* 1955, June, v. 59, No. 6, Sect. 1, 727–8, 4 figs.

Bites of the spider *Latrodectus tredecimguttatus* present a medical problem in the Istrian districts of Yugoslavia [this *Bulletin*, 1951, v. 48, 921; 1953, v. 50, 967].

The present author made post-mortem studies of various species of

laboratory animals which had been bitten on the nose by the spider. Histological examination of the organs at varying intervals after death showed striking changes in the liver and kidneys and changes also occurred in the spleen, lymph nodes, thymus, adrenal, brain and heart.

In general, the toxic injury was a parenchymatous necrosis affecting especially blood vessels and epithelium, and also lymphoid and nervous tissues. The intensity of the changes was related to the duration—and probably the quantity—of poison absorbed.

It is suggested that the effects produced may be " an expression of the consequence of a general adaptation syndrome ".

Four photomicrographs of rat tissue show respectively (1) necrobiosis (2) necrosis in the liver (3) lymphopenia in the spleen (4) dissociation of the cortical cells of the adrenal. *H. J. O'D. Burke-Gaffney*

Gajardo Tobar, R. La especificidad de los sueros anti-aracnídicos. [**The Specificity of Anti-Arachnid Sera**] *Bol. Chileno de Parasit.* 1955, Jan.–Mar., v. 10, No. 1, 2–4.

The English summary appended to the paper is as follows: —

" Two human cases of *Latrodectus mactans* poisoning were successfully treated with *Latrodectus tredecimguttatus* anti-serum. Considering the morphological and biological similarities between both species, and the possibility of neutralizing the action of the poison of one of them with the antiserum of the other, there seems to exist evidence for considering *Latrodectus tredecimguttatus* as a variety of *L. mactans*."

TOXOPLASMOSIS

Moscovici, C. Ricerche immunologiche sui toxoplasmi e i sarcosporidi. [**Immunological Research on Toxoplasmata and Sarcosporides**] *Rendiconti Istituto Superiore di Sanità.* Rome. 1954, v. 17, Pt. 11, 1002–6. English summary.

In view of the morphological resemblance between *Toxoplasma* and *Sarcocystis*, the author carried out an investigation on their serological relationship, using the complement-fixation [CFT] and dye tests. The antigens for the complement-fixation test were prepared in the form of suspensions of formalized parasites, which were inoculated intraperitoneally into guineapigs, rabbits and rats. The sera of these animals were tested for the CFT against antigens of the homologous and heterologous parasites. The results are given in a table, from which it is seen that animals inoculated with sarcosporidial and toxoplasm material reacted positively only to homologous antigens, whereas, the dye test was negative in all cases. It is concluded that there is no immunological affinity between *Toxoplasma* and *Sarcocystis*. [See also this *Bulletin*, 1955, v. 52, 84, 294.] *C. A. Hoare*

Petrovický, O. Meningoencephalitis toxoplasmatica acuta—vyléčená Pyrimethaminem. [**Acute Toxoplasma Meningo-Encephalitis treated with Pyrimethamine**] *Časopis Lékařů Českých.* Prague. 1955, Apr. 29, v. 94, No. 18, 486–90. [63 refs.] English summary (4 lines).

A detailed history is given of a case of meningo-encephalitis due to toxoplasma infection. The patient was a woman aged 22. The onset was

gradual, with anorexia, fatigue and insomnia; after a week or so a febrile attack supervened, with nausea, vomiting and a scarlatinatiform eruption over the body except for the head, palms and soles. Pyrexia persisted for 10 days and did not respond to sulphathiazole; the patient then became afebrile and the general condition improved, but 2 days later a second febrile attack supervened, with headache, hyperaesthesia, nausea, paraesthesiae, and painful enlargement of the cervical glands. The patient was admitted to hospital, and examination revealed generalized lymphadenitis, meningism, nystagmus, unequal pupils, sluggish light reaction and slight left facial palsy. Signs of pyramidal irritation appeared, with choreiform movements and some clouding of consciousness; the patient became maniacal and hallucinated, and the neurological signs all became more marked. A diagnosis of toxoplasmosis was established by complement-fixation, dye and skin tests.

Treatment with pyrimethamine in a dose of 25 mgm. in 3 days, later increased to 50 mgm. daily and combined with sulphadiazine, was followed by a dramatic recovery. After 14 days no abnormalities were detected on neurological examination; the patient still had some residual weakness, headache and insomnia, but had recovered completely when examined 6 months later. *D. J. Bauer*

DERMATOLOGY AND FUNGUS DISEASES

Smith, J. G., Jr., Harris, J. S., Conant, N. F. & Smith, D. T. **An Epidemic of North American Blastomycosis.** *J. Amer. Med. Ass.* 1955, June 25, v. 158, No. 8, 641–6, 2 figs. [Refs. in footnotes.]

North American blastomycosis is now more frequently recognized in general practice in the endemic areas than it was 20 years ago, but until the present report appeared, it had been known only as a sporadic infection.

The authors describe an "epidemic" of 10 cases of the disease which occurred in a small area of Pitt County, North Carolina, during the 6 months period October 1953 to March 1954. The outbreak commenced and ended abruptly and there was no observed increase in the incidence of the infection in the surrounding counties. The ages of the 10 patients ranged from 7 months (the youngest patient on record) to 77 years, and seven of the ten were aged 16 years or under. In all the cases the disease was of the pulmonary type and only one had, in addition, a blastomycotic skin lesion. Three of the children had an eruption of erythema nodosum, a complication not previously described in connexion with blastomycosis. The symptoms, in general, were those commonly found in blastomycosis, and included fever, coryza, cough, pulmonary signs and symptoms, malaise and loss of weight; some of the patients were more acutely ill with toxic signs, high fever and laboured respiration.

In all cases, the diagnosis was based on the identification of *Blastomyces dermatitidis* in smears of morbid material or in culture from that material. In 8 cases the fungus was cultivated from the sputum and in 7 of these it was also seen in direct smears of the sputum. Gastric washings yielded the fungus in smear and culture in 2 cases; in one of these it was also found in the sputum, but in the other repeated examinations of sputum gave only negative results. In the remaining case (the 7-month-old infant) the diagnosis was made from lung abscesses at necropsy. Skin tests with blastomycin gave positive results in 5 cases and an equivocal reaction in another; 3 of the 5 were also sensitive to tuberculin but none reacted to the

histoplasmin or the coccidioidin tests. The complement-fixation test gave a positive result at low titre in 3 subjects aged respectively 1, 6 and 77 years.

The 3 adults and one 16-year-old patient were treated with stilbamidine, and 4 of the children with 2-hydroxystilbamidine. In all of these the response was good, the fungus disappearing from the sputum and the pulmonary lesions undergoing gradual resolution. There were no complications of the treatment. Of the 2 cases remaining, the 7-month-old infant, which had developed symptoms at the age of 5 months, died before the diagnosis was made, and the other child, aged 3, was nearly asymptomatic at the time of diagnosis. This patient continued to improve without specific treatment, a fact which indicates the possibility of a mild form of the pulmonary disease tending to spontaneous cure, like that seen in histoplasmosis and coccidioidomycosis. The findings of numbers of healthy reactors to the blastomycin test in the area bears out this possibility.

A study of social, topographical and climatic factors shed no light on the cause of the outbreak, but, in this connexion, a "study of the entire population" will be undertaken. The clinical and epidemiological features of the outbreak will be the subject of a future report. In an addendum, the authors refer to an 11th case. *J. T. Duncan*

Simuangco, S. A. & Halde, C. **Chromoblastomycosis: First Case in the Philippines.** *J. Philippine Med. Ass.* 1955, Mar., v. 31, No. 3, 117–20, 5 figs.

Alznauer, R. L., Rolle, C., Jr. & Pierce, W. F. **Analysis of Focalized Pulmonary Granulomas due to** *Coccidioides immitis*. *Arch. Pathology.* 1955, June, v. 59, No. 6, Sect. 1, 641–55, 22 figs. [50 refs.]

This important study of coccidioidal residual pulmonary lesions is based on 11 instances in which the diagnosis was made only after mycological examination of the affected lung tissue removed by surgical excision. The patients were all males of non-Negro race and their ages ranged from 21 to 47 years. In 4 of the cases the lesion was a solid fibro-caseous granuloma measuring from 1·8 to 2·5 cm. in diameter and situated, respectively, in the upper and lower lobes of the right and left lungs. These 4 patients were asymptomatic and none had a history of acute pneumonitis like that associated with primary pulmonary coccidioidomycosis; the discovery of the pulmonary lesions was incidental to a routine radiological examination of the chest. Lobectomy was performed in 3 of the cases and wedge resection in the fourth.

In the remaining 7 cases the lesion was a fibro-caseous granuloma with cavitation. These lesions, which measured from 1·5 to 3·5 cm. in diameter, were situated in the right lower lobe in 4 cases and in the right upper and left upper and lower lobes respectively in the other 3. Five of these 7 patients gave a history of acute pneumonitis of undetermined causation, followed by sporadic episodes usually marked by cough with haemoptysis and low grade fever, and there was radiological evidence of a persisting pulmonary cavity. The sixth patient had similar episodes but no history of initial acute pneumonitis, and the seventh patient had been entirely asymptomatic, the cavity having been discovered at a routine X-ray examination. Wedge resection was performed in all 7 cases and recovery from the operation was uneventful.

The coccidioidin skin test gave a positive result in every case; in 2 at

1 : 1000, in 6 at 1 : 100 and in 3 at 1 : 10. The serological complement-fixation test gave a diagnostic result in 6 of the cases, an equivocal in 1 and a negative result in 4.

Histologically, the lung tissue surrounding the lesions showed, in some cases, marked thickening of the interalveolar septa, and microscopic satellite lesions some of which were minute epitheloid tubercles with giant cells and others confluent tubercles, often with caseous centres. Some of the cavities were lined, in part, by a vascular granulation tissue which showed various grades of inflammatory reaction and even signs of recent haemorrhage. Both the solid lesions and the cavities were distinguishable from similar lesions caused by other infections only by the discovery of the parasitic spherules or the developing sporangia of *Coccidioides immitis*, which were to be found, in sections stained by haematoxylin and eosin, chiefly in the caseous centres of the solid lesions and the tags of caseous matter attached to the lining of the cavity; in 2 cases with cavity they were also found in the communicating bronchus. The mycelial form of the fungus was found in 3 of the cavities with communicating bronchi [see also Puckett, this *Bulletin*, 1954, v. 51, 1293].

Although coccidioidal pulmonary residuals may persist for years and harbour the living fungus for a considerable time, no instance of secondary dissemination of the infection from such foci has been recorded, nor is there any evidence of the transmission from these sites to another host. The lesions are, on the whole, innocuous, but a subpleural cavity may rupture spontaneously and give rise to hydropneumothorax or pyopneumothorax and to broncho-pleural fistula. Although the infection may be active in the pleura, such an extension has not been known to lead to further dissemination of the disease. Probably this immunity is attributable to the resistance acquired in the primary pulmonary stage of the disease.

The authors repeat Zimmerman's exhortation [see *Bulletin of Hygiene*, 1955, v. 30, 231] that an adequate microbiological examination be made in all cases of supposed pulmonary tuberculoma.

The report is amplified by a survey of the relevant literature.

J. T. Duncan

TROPICAL OPHTHALMOLOGY

Bietti, G. B. & Pannarale, M. R. Primi risultati del trattamento del tracoma con la N,N¹dibenziletilendiamina dipenicillina G (Benzathine penicillin G, Wycillina A.P.) somministrata in carichi distanziati. Valore di essa nella terapia di massa. [**First Results of Treatment of Trachoma with Benzathine Penicillin in Spaced Injections and its Use in Mass Treatment**] *Igiene e San. Pubblica*. Rome. 1955, Jan.–Feb., v. 11, Nos. 1/2, 17–45. [30 refs.]

The English summary appended to the paper is as follows:—

"A penicillin preparation, N,N¹dibenzylethylendiamine dipenicillin G (Benzathine Penicillin G, Wycillina A.P.) has been tried by the authors for the treatment of Trachoma. The product is characterised by a very slow and prolonged absorption. This property allows to obtain penicillin blood rates which are clinically active in several bacterial infections by administering the preparation intramuscularly every 1–3 weeks.

"The aim of these therapeutic trials was based on the view of obtaining, if possible, results in trachoma with distant injections of the product, rather

than with an administration at little intervals, which are to be employed for attaining effective results through the usual antibiotics or the sulphonamides active against trachoma.

" Indeed, this type of administration reduces remarkably the possibilities of a universal treatment of the trachomatous patients, unless these may be treated, as in schools and colleges, easily daily and for some weeks or months.

" Three groups of patients with well developed trachoma (II stade), respectively 18, 10 and 7 subjects, were treated with N,N¹dibenzylethylendiamine dipenicillin G: the 18 patients of the first group were given for a minimum of 5 times and a maximum of 8 times intramuscular injections of the product at an interval of 14 days, thus receiving a total antibiotic dose of almost 2000–3000 units a day per kg. of body weight every day (on the whole 900,000 U. of penicillin by injection for children of 20 kg. body weight, and 1,800,000 U. for adults of 50–60 kg. of weight). [This dosage has been calculated on the basis of daily dose/kgm. over the 14-day period.]

" By the second group, of 10 patients, the intramuscular injections were practised 4–6 times at an interval of 20 days, always with the same daily dosage per kg. body weight.

" By the third group were made 3–4 intramuscular injections with the same dosage, but at an interval of 30 days.

" After 4 months of the treatment by 22 cases a complete disappearance of the granulations (complete recovery), and by 7 cases an almost complete disappearance (nearly a complete recovery) have been observed: on the whole 12 recoveries in the first groups, 7 in the second and 3 in the third groups. By the three groups 2, 3 and 2 cases respectively showed a nearly complete recovery, whereas only 6 cases undergo scarce or no improvement at all.

" The relatively little number of the experimented patients does not allow to be drawn any sure conclusion by comparison of the three types of administration as far as their respective effectiveness is concerned, however, one can assert, that the administration of N,N¹dibenzylethylendiamin dipenicillin G for 4–6 times at 20 days interval affords certainly a complete cure in the majority of trachoma patients.

" This form of treatment may thus be recommended for a larger clinical experiment, specially by those patients, who cannot, owing to various reasons, undergo the usual antibiotic therapy.

" These researches also show that penicillin may be considered as effective against trachoma, and its action, as it is observed for the sulphonamide therapy, is more effective by maintaining moderate blood rates of the antibiotic over a long period rather than affording higher but not constant and not durable rates.

" The authors are studying the possibility of a local application of N,N¹dibenzylethylendiamin dipenicillin G by subconjunctival injections. This method may signify a notable reduction of the cost of the treatment."

Carricaburu, P. Essai de traitement du pannus trachomateux par la dihydrostreptomycine. [**Trials of Treatment of Trachomatous Pannus with Dihydrostreptomycin**] *Bull. Med. de l'Afrique Occidentale Française*. 1954, v. 11, No. 2, 181–2.

The author treated 48 cases of trachoma, stage II, with 3 sub-conjunctival injections of dihydrostreptomycin (50 per cent. solution) weekly for 2 weeks. The treatment was well tolerated and was no more painful than injection of sulphonamides.

The patients also received local treatment with silver nitrate and instillation of Gantrisin.

Of the 48 patients, 26 were almost completely cured and 13 were greatly improved. Similar treatment of 15 cases with a 25 per cent. preparation of dihydrostreptomycin was unsuccessful.

It is suggested that failures by other workers have been due to the use of too low a concentration of the antibiotic. *H. J. O'D. Burke-Gaffney*

Freyche, M. J., Nataf, R., Maurin, J. & Delon, P. Recherches cliniques et de laboratoire au sujet d'un test de guérison du trachome. [**Clinical and Laboratory Research on a Test of Cure of Trachoma**] *Arch. Inst. Pasteur de Tunis.* 1955, Jan., v. 32, No. 1, 111–30.

If cortisone is instilled into the conjunctival sac for some days in cases of trachoma which by clinical, slit lamp and microscopic examinations are supposed to be cured, and reactivation whether brief, transitory or prolonged occurs, then the trachomatous virus has not really been eliminated. On the other hand, if the clinical and slit lamp examinations including the microscopic picture show no evidence of reactivation, then the disease may legitimately be considered cured.

Using this test of cure, the authors in the course of the year 1954 have employed it on 50 cases. In 5 of these cases clinical manifestations recurred and in 11, reactivation was proved by microscopic examination with the finding of inclusion or rickettsoid bodies. These were always found between the 3rd and the 11th day and never at a later date.

The test is of value in ascertaining a cure and shows that the virus can persist although its presence cannot be proved by the more usual methods of investigation.

Further research requires to be done as it is not understood why cortisone does not reactivate the virus in all or even a larger number of cases. Other methods of administration may be tried and perhaps other substances, as up to now the absence of a simple test of permanent cure in the treatment of trachoma has long been keenly felt. *E. W. O'G. Kirwan*

See also p. 1097, Landau & Gabbay, **Ocular Leprosy in Israel.**

See also p. 1060, Debeir, Troubles oculaires et amblyopie toxique au cours du traitement de la trypanosomiase humaine africaine. [**Eye Complications and Toxic Amblyopia during Treatment of Human Trypanosomiasis in Africa**]

MISCELLANEOUS DISEASES

Manson-Bahr, P. E. C. **Tropical Phlebitis.** *East African Med. J.* 1955, May, v. 32, No. 5, 165–8. [12 refs.]

Tropical phlebitis occurs in young, apparently healthy, persons in small outbreaks. It is nearly always relapsing in character but differs from cases described as thrombophlebitis migrans in running a shorter course and in being dissociated with thrombosis of the pulmonary veins or with thromboangiitis obliterans. Microscopic examination suggests that the lesion is primarily a phlebitis with a secondary thrombosis spreading centripetally. It usually affects more than one vein. A viral origin appears probable

although allergy may play a part. Illustrative cases are described and the literature is reviewed. [See also this *Bulletin*, 1948, v. 45, 545, and 1951, v. 48, 81.] *Frederick J. Wright*

Bras, G., Brooks, S. E. H. & Depass, E. E. **Data about Malignant Neoplasms and about the Incidence of Cirrhosis of the Liver in Jamaica.** *Documenta Med. Geograph. et Trop.* Amsterdam. 1955, June, v. 7, No. 2, 146–53, 4 figs. [16 refs.]

This is a report on malignant neoplasms encountered in the Pathology Department of the University College of the West Indies from the 1st September 1952 to 31st August 1954. During these 2 years 372 autopsies were performed, in 56 of which a malignant neoplasm was found and was the direct cause of death in 55. Graphs show the age and sex distribution, with the usual excess of female deaths at ages 36–45 and at 55–60; the deaths from cancer and those from other causes in relation to the total population in each age group are compared [but the absolute numbers are given without separation of the sexes and comparative rates are not worked out].

A table gives details of the histological types of the 56 growths; the most striking observation is that only one primary liver cell carcinoma (hepato-cellular type) was seen and the authors add in a footnote that among 1,600 autopsies at other hospitals during 1951–53 three cases only were seen. A table is given showing the percentages of cases of cirrhosis found at autopsy in various countries, ranging from 1·6 per cent. in London (number of autopsies not stated) to 12·6 per cent. in Zurich; in Kingston, Jamaica, the percentage was 3·2 of 1,632 autopsies, as in the present series. In South Africa the percentage was 6·3 in Africans and 3·8 in Europeans, in Kenya 6, and in Uganda 2·9–4·4 in males, and 1·6–3·5 in females, in 2,718 autopsies: all these are countries in which primary carcinoma of the liver is common among the indigenous inhabitants. Malnutrition among the Jamaican population is only seen in the younger age-groups and kwashiorkor is not usual above the age of 2 years. The authors consider that cirrhosis is the end-result of a variety of noxious factors, of which dietary deficiency is only one. Compared with Africa and Indonesia, the authors say, Jamaica is very healthy; endemic diseases such as malaria, severe helminthic infection and other factors such as accumulation of iron pigment in the liver do not occur. It is such factors, combined with malnutrition, which lead to cirrhosis of the liver and primary hepato-cellular carcinoma.

Carcinoma of the uterus (mainly of the cervix) is frequent; in 1953 there were 133 among 357 cases of malignant disease—37·3 per cent. [Higginson (this *Bulletin*, 1954, v. 51, 735), found 24 per cent. in the Bantu of Johannesburg, 54 per cent. of all cancer in the female].

Carcinoma of the penis or of the breast, both of which are very prevalent in Jamaica, were not represented in this series of autopsies. [The authors have omitted to mention the races from which the series was drawn. For a study on primary carcinoma of the liver in Negroes in U.S.A. see Kennaway (*ibid.*, 1945, v. 42, 150), also Berman (*ibid.*, 1951, v. 48, 845).]

W. L. Harnett

Nehaul, B. B. G. **Datura Poisoning in British Guiana. Report of Four Cases.** *West Indian Med. J.* 1955, Mar., v. 4, No. 1, 57–9, 1 fig.

An account of 4 cases.

PARASITOLOGY: GENERAL

COLE, W. H. [Edited by.] **Some Physiological Aspects and Consequences of Parasitism.** pp. xi + 90, numerous figs. [Numerous refs.] 1955. New Brunswick: Rutgers University Press, New Jersey. [$2.00.]

Annual conferences on the general theme of protein metabolism have been held since 1945 on the initiative of the Bureau of Biological Research at Rutgers University, New Jersey.

Studies on the modification of metabolism in the host as a result of parasitism and on the metabolism of parasites themselves have been presented in a Symposium under the title—"Some Physiological Aspects and Consequences of Parasitism". Parasitic protozoa and helminths came under review. Some of the serological reactions to which they give rise were also discussed.

In a short introduction, L. A. STAUBER has welcomed the awakening interest in the physiology of parasites as evidenced by the number of conferences and publications dealing with that subject in the United States within recent years. According to him, "the log phase of studies on the physiology of parasitism" has been entered upon and topics in which development is highly probable have been discussed. W. TRAGER, a pioneer in cultivation studies on malaria parasites, has summarized the state of our knowledge on this subject. He believes that progress in malarial physiology requires the *in vitro* growth of the parasite in the absence of the host cell. The subject, although of interest, does not appear to fit in very well with the general title.

In the following article by J. W. MOULDER, "The Protein Metabolism of Intracellular Parasites", the relationships between parasite and host in the case of malarial parasites, viruses and rickettsiae are indicated. Since malarial parasites in particular are equipped with enzyme systems common to vertebrates, it remains a mystery why an intracellular habitat has been adopted. The contribution made by the host to parasite reproduction is also considered. The bacterial viruses, which depend on energy supplies and synthetic enzymes of the host, appear to be poles apart from the malarial parasites in this respect, while rickettsiae occupy an intermediate position. Definite advances in the comparative biochemistry of intracellular parasitism are still awaited.

In the following chapter on "Intestinal Physiology and the Host-Parasite Relationship" by Clark P. READ, the author concludes that there is a very close relationship between the physiological characters of the intestinal tract and certain intestinal helminth parasites. The study of this relationship has benefited from both *in vivo* and *in vitro* studies.

In Ernest BUEDING's article—"Studies of the Glycolytic Enzymes of *Schistosoma mansoni*", enzymes characteristic of this trematode are discussed in relation to enzymes possessing similar functions in the host. In this connexion, the properties of several glycolytic enzymes of the worm were closely compared with those of the host. The results described indicate that enzymes with the same function in host and parasite were not identical in properties. It is suggested that studies in comparative biochemistry may be of significance for advances in chemotherapy.

In a chapter on "Studies in Antibody Formation", W. H. TALIAFERRO has reviewed results obtained especially from the dynamic aspect of anti-sheep haemolysin formation in the rabbit. This report may seem somewhat divorced from the subject-matter in the title, but it is pointed out that antibodies, almost universally associated with parasitism, lend themselves well to the study of protein metabolism. The part played by the

spleen and tissues in antibody production under various experimental conditions is indicated and the description of methods adopted to study the mechanism of antibody synthesis makes interesting reading. The material in the final chapter by L. A. Stauber on "Leishmaniasis in the Hamster" fits in well with the title of the volume. He has studied the course of this infection in great detail and describes its effects on the host with appropriate references to the literature, in a way that will be appreciated by those interested in this subject. *J. D. Fulton*

Radke, M. G., Thomas, R. C., Mracek, J. F., Nibley, C., Jr. & Aronson, R. S. **Is Korean Service a Health Hazard to Civilian Communities?** *U.S. Armed Forces Med. J.* 1955, June, v. 6, No. 6, 794–8, 2 figs.

The controversial question as to whether members of the U.S. forces returning from war service in the Far East would become carriers of tropical infections arose again at the outbreak of the campaign in Korea.

The authors, in the Third Army area, Fort McPherson, Georgia, have now studied 4,438 food-handlers (925 soldiers with Korean service, 2,799 without Korean service and 714 civilians). The area was chosen because the south-eastern region of the United States has always been regarded as having a higher incidence of intestinal parasites.

The object was to discover whether (1) servicemen from Korea were likely to show higher rates of infection than those without Korean service, (2) infection was more frequent in military than in civilian food-handlers, (3) a racial difference in infection rates existed.

Nine Army units took part in the survey. A single specimen of faeces was taken from each man: half was examined bacteriologically by conventional methods and the other half was examined for parasites by the modified ether sedimentation technique. The results are shown in a series of graphs.

About 10 per cent. of the food-handlers harboured pathogenic agents. Altogether 655 had one or more protozoa (243 had a single pathogenic protozoon): 146 had one or more types of helminths: 51 had protozoa and helminths: and 7 had a significant bacterial agent.

Incidence was higher in military than civilian food-handlers, accounted for by a higher parasite but lower bacterial rate. Caucasians showed more infection than Negroes, but Negroes had a slightly higher percentage of non-pathogenic protozoa.

Soldiers without Korean service had a slightly higher percentage of positive stools than those with Korean service, but helminth infections were commoner in those returning from Korea. It is pointed out that repeated examination would have increased the positive results.

It would seem from this limited study that parasitic and bacterial infections in servicemen returning from Korea do not constitute a hazard to existing health conditions in the United States. *H. J. O'D. Burke-Gaffney*

ENTOMOLOGY AND INSECTICIDES: GENERAL ZOOLOGY

[Papers on the toxic effects of insecticides in man are abstracted in the *Bulletin of Hygiene* under the general heading of Occupational Hygiene and Toxicology.]

Hamon, J., Abonnenc, E. & Noël, E. Contribution à l'étude des Culicidés de l'Ouest du Sénégal. [**Observations on Mosquitoes of West Senegal**] *Ann. Parasit. Humaine et Comparée.* 1955, v. 30, No. 3, 278–308, 6 figs. [37 refs.]

Sixty-six species and varieties of mosquito are now known from Senegal, the present paper adding several species to lists by earlier collectors. Most of the work in this survey centred on an area within 75 kilometres of Dakar, although a brief visit was made southwards towards the Senegal-Gambia border. Anopheline species recorded are: *A. coustani* var. *ziemanni*, *A. brunnipes*, *A. flavicosta*, *A. funestus*, *A. gambiae* and var. *melas*, *A. wellcomei*, *A. maculipalpis*, *A. rufipes* and var. *ingrami*, *A. pharoensis* and *A. squamosus*. The number of species in the culicine genera is shown in brackets: *Toxorhynchites* (1), *Uranotaenia* (2), *Aëdomyia* (2), *Ficalbia* (8), *Taeniorhynchus* (3), *Aëdes* (16), *Eretmapodites* (1), *Culex* (21). The list includes *Aëdes aegypti* and its var. *queenslandensis*, *Culex fatigans* but not *C. pipiens* and neither *Aëdes africanus* nor *Aëdes pseudoafricanus* is recorded.

Aëdes aegypti adults occurred indoors, biting by day and breeding in a variety of classical containers. But they also bred abundantly in tree-holes of baobabs; outdoor biting in the evening was never experienced. There are no biological notes on the few *Aëdes simpsoni* recorded. *C. fatigans* occurred in Dakar and one or two other townships studied and is apparently essentially a town-dwelling domestic species in Senegal as elsewhere, although larvae accepted as of this species were found in a small village in " the bush ". *Anopheles gambiae* is the dominant domestic species in the coastal area. The authors do not make it clear to what extent they include var. *melas* in this statement and this seems to be because of their difficulty in feeling satisfied about the differentiation of the two forms on any morphological feature or on the salinity tolerance of the larvae. *Anopheles funestus* predominates inland.

There are brief biological notes for all the species and an indication of their distribution elsewhere in Africa besides the localities of capture in Senegal.

D. S. Bertram

Adam, J. P. Quelques anophèles nouveaux pour la faune camerounaise. [**Some Anophelines newly recorded in the French Cameroons**] *Ann. Parasit. Humaine et Comparée.* 1955, v. 30, No. 4, 389–94. [22 refs.]

Surveys in the forest areas of the French Cameroons in 1953 revealed two anopheline species new to the territory: *Anopheles cinctus* and *A. wellcomei*, both in the larval stage and *A. wellcomei* also as adults. The larvae of *A. wellcomei* were among *Pistia* at the edge of a river and the adults in small numbers in village houses. One of 38 females examined showed oöcysts but none showed sporozoites.

Anopheles moucheti has not been reported in numbers before but has now been found abundantly in houses of some villages predominating over *A. gambiae*, *A. funestus*, *A. nili* and *A. marshalli*. Salivary gland infections were found in 1·6 per cent. of 812 *A. moucheti* dissected. Larvae of this

species were taken abundantly along the edges of rivers and their tributaries, particularly among *Pistia*. It is not thought, however, to be an important malaria vector.

Further specimens of a recently described species, *A. rageaui* [this *Bulletin*, 1954, v. 51, 1110], have been found. The adults were near human habitations and in an unoccupied house about 100 metres from the breeding place (the only known one for this new species), which was very shallow water in the masonry structure of an ancient village dam. It would, then, be best considered as exophilic, but not as cavernicolous, in resting habits as the original finding of adults suggested. It breeds with *A. rhodesiensis* which is also known in the Southern French Cameroons only from this place. *D. S. Bertram*

Gillies, M. T. **Notes on the Eggs of some East African** *Anopheles*. *Ann. Trop. Med. & Parasit.* 1955, June, v. 49, No. 2, 158–60, 3 figs.

The eggs of *Anopheles wilsoni*, *A. machardyi*, *A. rhodesiensis* and *A. seydeli* are described for the first time and those of *A. leesoni* and *A. keniensis* are redescribed. In the case of *A. leesoni* some eggs of a batch were as previously described elsewhere, but others rather resembled *A. marshalli*. The eggs from *A. keniensis* females caught in the type locality for this mosquito (Taveta forest, Kenya) were identical with descriptions of eggs of *A. demeilloni* in De Meillon's standard work on Ethiopian mosquitoes. The relationship of *A. demeilloni* to *A. keniensis* requires further study. There seems need, too, to reconsider the identity of mosquitoes identified as *A. keniensis* in Kaimosi Forest, Kenya, in yellow-fever studies [this *Bulletin*, 1946, v. 43, 736]. The eggs from these were rather different in detail from those now described for *A. keniensis*. *D. S. Bertram*

DeCoursey, J. D., Webster, A. P. & Leopold, R. S. **Studies on the Effect of Insecticides on the Oviposition of** *Anopheles quadrimaculatus* **Say.** *Ann. Entom. Soc. of America.* 1953, Sept., v. 46, No. 3, 359–65, 1 fig.

The authors have largely repeated a previous investigation with wild-caught *Aëdes sollicitans* [this *Bulletin*, 1953, v. 50, 765] using laboratory reared *Anopheles quadrimaculatus*. The results are fairly similar, in that various insecticides seem to stimulate oviposition in poisoned female mosquitoes. This was not clearly shown when the insects were provided with wet filter papers for laying on, because the untreated controls laid quite freely. But the insecticides seemed to increase laying on dry paper. [Some of the differences are said to be statistically significant at the 2 or 4 per cent. level: but the standard errors are all very high.] A distinct difference appeared in egg laying of females sprayed by 2 per cent. chlordane, who all laid plentifully in the 15 minutes after treatment, compared with controls sprayed with water.

"Mechanical stress" (*i.e.*, decapitation or damage to the head) did not stimulate oviposition in *Anopheles quadrimaculatus* as it did in *Aëdes sollicitans*. *J. R. Busvine*

Gillett, J. D. **Behaviour Differences in Two Strains of** *Aëdes aegypti*. [Correspondence.] *Nature*. 1955, July 16, v. 176, 124–5.

It is becoming evident that the mosquito *Aëdes aegypti* is by no means homogeneous even within the African continent, a point which may prove of great interest in relation to ability of insects from different areas to

transmit infections. In the present note the author compares two strains, one from Lagos, Nigeria, the other from Nawala, Tanganyika. In the Lagos strain females which have not been mated usually lay eggs within 5 days of taking a blood meal, but this rarely occurs in the Nawala strain. It seems then that whatever the male's contribution to ovulation, the female of the Lagos strain is largely independent of it. The author discusses and expands these observations. The difference, as he points out, may well be due to the production of some hormone, presumably in the Nawala strain, which depends on a stimulus resulting from filling the spermathecae.

P. A. Buxton

Lewis, D. J. **The *Aëdes* Mosquitoes of the Sudan.** *Ann. Trop. Med. & Parasit.* 1955, June, v. 49, No. 2, 164–73, 9 figs. [26 refs.]

This is a further valuable addition by the author to the records of the medical entomology of the Sudan. It not only supplements the data on 8 species of the subgenus *Stegomyia* previously reported [this *Bulletin*, 1953, v. 50, 858], but adds records and notes for the subgenera *Mucidus* (2 species), *Ochlerotatus* (2 species), *Finlaya* (1 species), *Aëdimorphus* (15 species), *Banksinella* (3 species) and *Diceromyia* (2 species). Maps illustrate their distribution. Discontinuous distribution of insects is a common feature for the arid Northern Sudan. This is less usual in the genus *Aëdes* which may be explained by many species having drought-resistant eggs.

There are brief comments, serving mainly as a guide to other recent literature on the relationship of *Aëdes* mosquitoes to yellow fever, dengue (not known in the Sudan now for many years), and the recent record for West Nile virus. Many *Aëdes* species are very annoying man-biters, besides *A. aegypti* and *A. vittatus* named in connexion with these virus infections.

D. S. Bertram

I. Vermeil, C. Nouvelle contribution à l'étude du complexe *Culex pipiens* en Tunisie. [**New Observations on the *Culex pipiens* Complex in Tunisia**] *Arch. Inst. Pasteur de Tunis.* 1955, Jan., v. 32, No. 1, 133–5.

II. Vermeil, C. Contribution à l'étude d'un biotype tunisien du Moustique commun, *Culex pipiens* L. [**Study of a Tunisian Biotype of a Common Mosquito, *Culex pipiens***] *Arch. Inst. Pasteur de Tunis.* 1955, Jan., v. 32, No. 1, 137–45, 4 graphs.

I. From 11 strains of *C. pipiens* collected from the neighbourhood of Tunis, 5 yielded at least one autogenous female, usually after one generation in the laboratory.

Collections of egg rafts from Tozeur, in the sub-Sahara south of Tunisia gave a strain that was reared for 8 to 10 generations in the laboratory. This strain was stenogamous, anautogenous and ornithophilous. The characteristics of this strain explain why men are seldom bitten, despite the numerous *C. pipiens* type mosquitoes found in oases round the Sahara.

Crossing tests with the strains from northern Tunisia gave fertile eggs only in the following mating: Tozeur males × autogenous Tunis females. The F_1 progeny were stenogamous, anautogenous and anthropophilus.

II. Egg rafts taken from a flooded basement of a hotel in Tunis were reared in the laboratory for several months. Later another strain was obtained from El Menzah, a suburb of Tunis, and this was also reared in captivity.

Larval exuviae of these strains were examined and the following averages recorded: A = Siphon index (length/breadth); B, C, D, E = mean

numbers of setae in the 1st-4th siphonal tufts; Mt = mean number of teeth on the mentum (excluding the central one). The characteristics of these measurements in the two Tunisian strains are shown by charts, in comparison with typical *pipiens* and *autogenicus* as recorded by Callot (*Ann. Parasit. Humaine et Comparée*, 1947, v. 22, 380). It is seen that the data for the Tunisian strains approximate to the *autogenicus* type. [It is difficult to judge the validity of comparisons with the curves given, since no statistical analysis has been done. At least the standard errors of points should be given.] *J. R. Busvine*

Mitra, R. D. Notizen über Phlebotomen. Phlebotomen der West-Ghats. [**Notes on *Phlebotomus* of the Western Ghats, Bombay State**] *Ztschr. f. Tropenmed. u. Parasit.* Stuttgart. 1955, Apr., v. 6, No. 1, 80–85, 1 fig. [10 refs.]

This paper gives the results of a sandfly survey made in October and November 1951 in the north-western region of Bombay State, covering an area of about 1,500 square miles. *P. argentipes* and *P. papatasi* were collected in large numbers, together with one specimen each of *P. thapari* and *P. chakravarti*. Climatic conditions in the area studied are stated to be optimum for the breeding of sandflies for a large part of the year.
D. M. Minter

Downes, J. A. **Observations on the Swarming Flight and Mating of *Culicoides* (Diptera: Ceratopogonidae).** *Trans. Roy. Entom. Soc. of London.* 1955, May 20, v. 106, Pt. 5, 213–36, 5 figs. on 2 pls. [22 refs.]

This paper brings together and discusses observations over several years on swarming and mating in the blood-sucking genus *Culicoides* and related midges. An earlier note (*Nature*, 1950, v. 166, 510) gives an account of these matters as observed for *Culicoides nubeculosus* and this is an extension of the topic. Most of the data are about British species although one or two observations are about Canadian species at Churchill, Manitoba. Observations were mainly made from just before sunset until near darkness, apparently the usual period in which many species swarm.

C. nubeculosus, chiefly studied at a farm at Chideock, Dorset, where it bred in puddles and marshy patches fouled by cattle droppings, swarmed over dark patches—cow-dung pats, small muddy patches and experimental dark cloths—showing distinctly against a light sandy road. The swarms remained throughout an hour of observation, reforming if disturbed. They form columnar shapes extending 2–8 ft. above ground and about 1 ft. in diameter. The midges waved within a 12-inch traverse sideways constantly, and occasionally to and fro or vertically within the column, but they always faced in one direction into a very slight breeze. Swarms were of up to 70 males; a female was noted only once. The dark patches of various kinds over which swarming occurred are called swarm-markers. They are apparently detected visually. At winds over 2–3 m.p.h. swarming did not occur.

Swarming is not fundamentally an expression of gregarious habit, as single males can take up a swarming position and carry on with all the activities seen in a swarm of numerous specimens and continue to do so for a considerable time.

It seems clear that females enter such swarms, mating in flight then happens and the copulating pair drift to the ground. During swarming the

antennal hairs of the male are erect, unlike the decumbent state they adopt in other circumstances. They are considered to be receptive, when erect, to sounds from the female.

In captivity, mating of non-flying pairs of *C. nubeculosus* occurs in 3″ × 1″ glass vials and erection of antennal hairs in the absence of flight does not then occur. Crawling of the male over the female seems an important stimulus. Male *Culicoides* make some attempt in such containers to mate with other males and even with males and females of other species.

C. riethi: Swarming was observed at Airth, Stirlingshire, in Scotland at a breeding place of brackish mud on the shores of the River Forth. Numerous other species also bred in this mud. Swarming habits and the significance of markers applies to this species as to *C. nubeculosus* but contact-mating in small vials was less frequently induced.

Other species for which the findings on male swarms are also similar are: *C. punctatus*, *C. halophilus*, *C. impunctatus*, *C. grisescens* and *C. pallidocornis*. In the case of the *C. obsoletus* group an immense *female* " cloud " was once seen near a byre (cowshed) but this is considered to have been, perhaps, a chance accumulation of hungry females in the proximity of a host.

Swarms of both males and females have been observed for *Ceratopogon* species in Scotland, and a *Bezzia* species in Canada.

There is a good discussion which should be read in the original.

D. S. Bertram

Rageau, J., Grenier, P. & Adam, J. P. Tabanidae du Cameroun français. [**Tabanids of the French Cameroons**] *Ann. Parasit. Humaine et Comparée*. 1955, v. 30, No. 3, 243–71. [Numerous refs.]

The present work brings the known species of Tabanidae in the French Cameroons to about 65, most of them being taken in the forest region in the south. Savannah and mountainous regions are yet to be studied fully. The numbers of species in the genera are shown below in parenthesis: *Tabanus* (32), *Haematopota* (10), *Chrysops* (5), *Tabanocella* (3), *Hippocentrum* (2), *Ancala* (2), *Atylotus* (2), *Hinea* (2), *Euancala* (1), *Thaumastocera* (1), *Subpangonia* (1), *Stenophara* (1), *Nuceria* (1), *Thriambeutes* (1), and *Dasycompsa* (1). Both *Chrysops dimidiata* and *C. silacea* are common and aggressive man-biting species and, besides several *Tabanus* species, *Tabanocella stimulans* and *Hippocentrum strigipennc* also attack man.

This paper is mainly concerned to list the species with locality names and months when captured. Some brief biological notes serve to emphasize the paucity of data on breeding, habits of male flies, seasonal abundance, cycles of activity and host preferences. The rôle of tabanids in mechanical transmission of trypanosomes to cattle and horses is recognized as a matter for future investigation for which these records are an essential beginning. It is probably sound to accept *C. dimidiata* and *C. silacea* as important vectors of loiasis in the territory.

The authors report, but without details, that they have taken a single male of *C. dimidiata*.

D. S. Bertram

Lewis, D. J. **Calliphoridae of Medical Interest in the Sudan.** [**Diptera.**] Reprinted from *Bull. Soc. Entom. Egypte*. 1955, v. 39, 275–96, 6 figs. [Numerous refs.]

Many notes on myiasis in man and animals.

Enigk, K. Zur Biologie der Zecken. [**The Biology of Ticks**] Reprinted from *Deut. Entomologentag in Hamburg.* 1953, July 30–Aug. 3, 96–102, 1 fig.

Different species of ticks which are vectors of human and animal diseases are affected differently by climatic factors, particularly temperature and humidity, and experiments in the laboratory on the action of these factors may help to explain the ticks' geographical distribution, and their prevalence at different seasons of the year.

It was shown that species differed considerably in their resistance to low temperatures. *Boophilus calcaratus* was most easily affected, all specimens dying in 6 days at −2°C. *Hyalomma savignyi* was more resistant, some individuals surviving 5 days at −8°C. *Dermacentor pictus* was the most resistant; 40 per cent. survived for 35 days at −12°C., and a few for 5 days at −15°C. [No information is given about the conditions of exposure prior to the experiments, or as to whether care was taken to avoid any surface dampness of the ticks. Both these factors have been shown by other workers to influence death at low temperatures.]

The humidity of the air [presumably at room temperature] also affected survival. On the whole the species most easily killed by cold withstood desiccation best, but the data given are scanty.

The map shows good correlation between the experiments and the distribution of several species. Thus *Boophilus calcaratus* is restricted to South Spain, South Italy and the southern part of the Balkans; it is the species most susceptible to cold. The more resistant *Dermacentor pictus* ranges over all of Europe except the colder parts of Russia.

Ticks differ in their processes of excretion and digestion, and these may affect their ability to transmit disease.

This paper draws attention to many important problems on which further, more exact, work is clearly required. *K. Mellanby*

Puchta, O. Experimentelle Untersuchungen über die Bedeutung der Symbiose der Kleiderlaus *Pediculus vestimenti Burm.* [**Experimental Investigations on the Significance of Symbiotic Organisms in** *P. humanus* **var.** *corporis*] *Ztschr. f. Parasitenk.* 1955, v. 17, No. 1, 1–40, 5 figs. [Numerous refs.]

The paper opens with a review of previous work on symbiotic organisms in various blood-sucking insects. The position of the mycetome in the gut of *Pediculus humanus* var. *corporis* and the passage of micro-organisms to eggs are then described briefly, accompanied by a useful illustration. A strain of lice was bred by the technique of applying small boxes of lice periodically to a man's leg. In this stock strain the sex ratio was 1:1. Centrifuging lice for several hours was the means adopted for displacing the mycetome in embryos. A method of feeding lice through a membrane is described in detail and this was invaluable for feeding symbiont-free lice on known synthetic media in a base of defibrinated blood. Male lice developed successfully to adult stage and with normal function in the absence of symbionts, but females failed to mature or died soon after the final moult.

A substantial part of the paper is concerned with the effects of different synthetic media given as food to lice by the membrane technique. The media include various components of the vitamin-B complex, besides yeast extract itself. Yeast extract was sufficient to give normal development of males, but not of females. Excessive feeding with this extract, however, killed lice, particularly those with symbionts and mycetome intact. The relative importance of thiamine, riboflavine, pyridoxine, nicotinic acid,

pantothenic acid, folic acid and β-biotin is assessed as a development of the general observation that vitamin B was effective in promoting successful growth of the lice, although, like yeast extract, excess resulted in heavy mortalities. Those interested in the nutritional requirements of blood-sucking insects should consult this paper in the original. *D. S. Bertram*

Huttel, W. & Huttel, Nancy. Les Cératopogonides à travers les âges et les continents. [**Ceratopogonidae throughout the Ages and the Continents**] *Acta Tropica*. Basle. 1955, v. 12, No. 2, 123–35, 6 figs. [100 refs.]

McIntosh, A. H. **Particle Size of Insecticidal Suspensions and their Contact Toxicity. V. Effect of Physical Properties on Toxicity of Compounds in the DDT Group.** *Ann. Applied Biol.* 1955, June, v. 43, No. 2, 161–81. [Numerous refs.]

The series of papers by this author are devoted to the processes involved in pick-up by insects and penetration through their cuticles of contact poisons. This is particularly important in relation to the results of testing of insecticides. He has already shown (*Ann. Applied Biol.*, 1947, v. 34, 586) that different sizes and shapes of crystals are more or less easily retained on insects' bodies. Correction for this should be made in dipping or spraying tests. In this paper it is shown that the relative potencies of a series of DDT analogues differ according to whether they are applied as fine crystals or in colloid form, even when corrections were made for the quantities adhering to the test insect (a beetle, *Oryzaephilus surinamensis*). Where the insecticide under test was active in vapour form there was little difference in the results with colloids or crystals. Otherwise the result seemed to depend on two properties related to solution of poison in the wax of the insect cuticle (properties which could be measured by *in vitro* tests). In general, crystals were less effective than the supersaturated particles of colloids. Therefore, if the colloids crystallized out only slowly they remained efficient longer; and if the crystalline treatments were slow to dissolve in lipoids they were even more inefficient. Substances for which both these factors held good showed big differences in results between tests with colloids and crystalline preparations. But if either or both factors were opposite, there was little difference in the activity of the two preparations. *J. R. Busvine*

Sullivan, W. N., Hornstein, I., Yeomans, A. H. & Tsao, Chin-hsi. **Improved Deposits for controlling Insects Outdoors.** *J. Econom. Entom.* 1955, Apr., v. 48, No. 2, 153–5.

Residual deposits of insecticides on vegetation out of doors do not persist well. This may be due to the volatility of the insecticide or to penetration of foliage by the compound [Barlow and Hadaway, this *Bulletin*, 1947, v. 44, 1053; 1950, v. 47, 413]. In order to prolong the life of the more volatile residual insecticides, a film-forming substance, a chlorinated terphenyl, was added to the spray fluid [see Tsao *et al.*, *ibid.*, 1954, v. 51, 438]. At a ratio of 1 to 1 and, to a slightly smaller extent, at 0·125 to 1, this substance greatly prolonged the life of deposits of gamma BHC and aldrin. With DDT, however, the chlorinated terphenyl reduced effectiveness.

To render the DDT deposits more effective, a volatile solvent (methyl ethyl ketone) was used instead of a fuel oil or an emulsion base. On being sprayed into the air, the solvent largely evaporates, leaving the insecticide in semi-solid spheres about 100 microns in diameter. These sticky balls are deposited on various materials and except for slight flattening, retain their shape for several days before slowly flattening on the treated surface.

The effect of this is that deposits of DDT from this volatile solvent remain effective for much longer than equivalent deposits from an emulsion of fuel oil solution.

J. R. Busvine

Bellemare, E. R. & Belcourt, J. Influence du dérivé cyanuré du DDT sur le rythme cardiaque de *Periplaneta americana* (L.). [**The Action of the Cyanide Analogue of DDT on the Cardiac Rhythm of** *P. americana*] *Canadian J. Zool.* 1955, June, v. 33, No. 3, 175–81, 4 figs. [16 refs.]

The English summary appended to the paper is as follows:—

"The mode of action, on the heart of *Periplaneta americana*, of the cyanide analogue of DDT has been studied. Results of preliminary tests with rotenone confirm the findings of other investigators. Tests made with DDT produce a slight reduction of the cardiac rhythm. With the cyanide analogue of DDT, the rate of heart beat is also slightly reduced but, as with DDT, the pulsations continue long after paralysis has set in. The general intoxication symptoms produced by the injection of the cyanide analogue (in suspension) are likewise identical with those of DDT. The above results, together with results of experiments found in the literature, seem to be at variance with the hypothesis proposed by Krijgsman *et al.* that the heart mechanism of insects consists of a neurogenic pacemaker with adrenergic properties, controlled by a cholinergic accelerating nerve."

Bettini, S. & Boccacci, M. Azione tossica degli acidi iodo e cloroacetico sugli insetti. Inibizione della triosofosfato deidrogenasi. [**Toxicity of Iodo- and Chloro-Acetic Acids for Insects; Inhibition of Triose-phosphate Dehydrogenase**] *Riv. di Parassit.* Rome. 1955, Jan., v. 16, No. 1, 13–29, 7 figs. [20 refs.] English summary.

The authors have been investigating the effects of iodo- and chloro-acetic acids on two kinds of insect; the cockroach, *Periplaneta americana* and the house-fly, *Musca domestica*. These compounds are rather poisonous to vertebrates, their action being due to inhibition of SH-enzymes, especially triosephosphate dehydrogenase (TPD). A colorimetric method of estimating TPD in insect tissues is described in some detail. This is so used to demonstrate inhibition by iodo-acetic acid, both *in vitro* and (after injection of cockroaches) *in vivo*. The authors found that *in vitro* inhibition was proportional to time of incubation with iodo-acetic acid. Injection of 1 mgm. per gm. cockroach caused complete inhibition *in vivo*.

In the house-flies, tests of the lethal action and enzyme inhibition of chloro-acetic acid were done by exposing flies to blotting paper treated with olive oil solutions of this compound for a standard time. It was found that the curve of percentage inhibition was parallel to that for mortality.

The lethal action of chloro-acetic acid was similar in normal house-flies and in a strain resistant to chlorinated hydrocarbons. Attempts to produce a strain of flies resistant to chloro-acetic acid, by selective mortality over 30 generations, did not alter the lethal dose or the TPD activity of the colony.

J. R. Busvine

Colonial Insecticide Research. P.O. Box 204, Arusha, Tanganyika. **Progress Report No. 16, July 1954 to March 1955.** 26 mimeographed pp. 1955.

Since the publication of the previous report [this *Bulletin*, 1955, v. 52, 214] the blocks of woodland used for anti-tsetse spraying experiments have largely been occupied by African settlers, and fly numbers remain low. Another block has been found at Magugu and a fly dispersion test started.

Some data on the behaviour of coarse aerosol sprayed from aircraft above woodland have been prepared for publication, and a summary is given.

The anti-mosquito trials with sprayed huts at Taveta are nearing conclusion and some final details of individual treatments are given. Ants have been found invading many of the huts; their effects on the results vary from treatment to treatment according to the rapidity of actions of different insecticides. Some plans of the new Taveta-Pare malaria eradication scheme are given.

The laboratory and small-scale experiments briefly reported include sections on tsetse cultures, tests against coffee borer beetles, termites, chafer grubs, ladybirds and grain-eating birds.

The physics section have determined the output and droplet size distribution of various kinds of machines likely to be used in East Africa for producing aerosols from the ground.

Aircraft equipment designed to disperse granular insecticides has been calibrated.

The chemistry section have been determining residues of DDT, BHC, dieldrin, aldrin, chlordane and toxaphene in various materials. They have slightly simplified the method of estimating dieldrin as specified by WHO.

Tests of the persistence of parathion residues are also given.

J. R. Busvine

MISCELLANEOUS PAPERS

Papua & New Guinea Med. J. Port Moresby. 1955, May, v. 1, No. 1, 40 pp.

The first issue of this new journal is dated May 1955. It is introduced by Dr. J. T. Gunther, Director, Department of Public Health, and is published in Port Moresby.

The contents include 3 original articles (all general in scope, and not reporting new work), clinical notes, reviews of patrol reports, an editorial article and a few abstracts and reviews.

A journal of this kind could serve to bring to the attention of readers the health conditions of the area in which it is published, and this would be interesting. Its success would depend on the willingness of the local medical practitioners to record their experiences and on the care taken in presentation. The Bureau of Hygiene and Tropical Diseases extends its good wishes to this new journal. *Charles Wilcocks*

Woodruff, A. W. **Tropical Diseases in Britain.** *Brit. Med. J.* 1954, May 1, 1030–33.

Doctors who have practised in the tropics are well aware of the tragedies which occur when patients who arrive in Britain and other temperate countries after residence in the tropics are mis-diagnosed because the possibility of tropical disease is not borne in mind. The stories of *P. falciparum* malaria treated as if it was influenza are very common, and the result has too often been fatal.

In this short article Professor Woodruff describes briefly but effectively the features of malaria and other fevers, the bowel diseases and schistosomiasis, which may present the inexperienced practitioner in Britain with urgent problems of diagnosis and treatment of which he should be aware. The explanations and the instructions for diagnostic procedures are clear and

explicit, and the general underlying thesis is that these diseases must be included in differential diagnosis in patients who have been abroad. [This means, of course, that the doctor should know where the patient has been; the suggestion has been made before that provision should be made on all hospital case-sheets for a statement of where the patient has lived or travelled, to be entered as a routine.] *Charles Wilcocks*

Fendall, N. R. E. **Rural Health Centres in North Nyanza District of Kenya.** *J. Trop. Med. & Hyg.* 1955, June & July, v. 58, Nos. 6 & 7, 123–32; 149–57, 10 figs., 1 map & 2 charts. [10 refs.]

The North Nyanza District of Kenya contains nearly 750,000 Africans of Bantu, Nilotic and Hamite origins scattered irregularly throughout 24 locations. A district hospital and a dispensary service have been in existence for many years but the introduction of Rural Health Centres represents a new approach to the problem of providing for the health needs within the limits of available finance. The aim is primarily to bring the forces of preventive medicine and medical aid into touch with the homes through the medium of African Assistants. The importance of maintaining the authority of the Health Centre is stressed. The medical authorities administering the district should endeavour to advise rather than to dictate to the Africans in charge of the Health Centres. Maternity services and the check of communicable diseases are among the measures directly concerned with the promotion of health. Expenditure must be governed by available finance, in this instance largely by the wealth of the community, who, in turn, benefit and become enriched by improved health and from consequent increased production.

Difficulties encountered in the earlier stages include the popularity of the Centre, which attracts patients from areas beyond those which it is planned to serve.

[A lucid and encouraging report which should be consulted by those planning for a similar situation.] *Frederick J. Wright*

BOOK REVIEWS

Covell, Gordon [C.I.E., M.D.], Coatney, G. Robert [Ph.D.], Field, John W. [C.M.G., M.D.] & Jaswant Singh [M.B., Ch.B., D.P.H., D.T.M. & H.]. **Chemotherapy of Malaria.** *World Health Organization Monograph Series No. 27.* 123 pp., 10 figs. 1955. Geneva: Palais des Nations. [Sales agent for U.K., H.M. Stationery Office.] [17s. 6d.; $3.25; Sw.fr. 10.–.]

The drug treatment of malaria has very profoundly altered even since the earlier days of World War II when quinine was still the most widely used specific for the treatment of malaria. The universal acceptance of synthetic antimalarials, some already in limited use at that time, the discovery of yet others, and the disclosure of the existence of phases in the life cycles of the human malaria parasites then unrecognized, all have contributed to the changes. This growth of knowledge and the steady increase in the number of drugs, with their seemingly inevitable redundancy of nomenclature, have complicated rather than simplified the task of the practitioner called upon to treat the disease. When experts in constant touch with the problem, and versed in the literature on it, may be confused the practitioner dealing only

with the occasional case of malaria necessarily must find the greatest difficulty in selecting the most appropriate drugs for its treatment and prescribing them in the correct sequence and dosage. It is to resolve this difficulty that the present small volume has been produced by a drafting committee appointed by the Expert Committee on Malaria of the World Health Organization. The names of the authors are well known and they are internationally recognized experts in their own spheres. While their collective knowledge is exceptional they have presented their information in a simple factual manner, without the reservations and obfuscations only too evident in many communications on an involved and still developing subject.

The volume is divided into 5 chapters. As a first step in considering the drug treatment of malaria it is necessary to define terminology; this the authors have done briefly and clearly. After an historical review of the treatment of malaria there follows a chapter on the rationale of malaria chemotherapy, a grasp of which is essential to intelligent use of the drugs now available. The structures of quinine and of some basic groupings found in synthetic antimalarials are simply explained, with reference to graphic formulae. The developments leading to more detailed knowledge of the life cycle of malaria parasites are succinctly recorded, and the importance of the newly discovered exo-erythrocytic phases of the parasite in relation to the chemotherapy of the infections is made clearly evident. The effects of host immunity, tolerance and premunition, variations in strains of a single species of parasite; and the synergic effect of combinations of drugs on chemotherapy of the malarias are explained.

The third chapter contains a clear account of the applicability, toxicity and contraindications to the use of the various conventional antimalarial drugs; the rapidity of their absorption and elimination, and the sites of their concentration are discussed in so far as they apply to their practical employment in treatment. In this connexion it is interesting to note that syphilis of the central nervous system is held to be a contraindication to the use of mepacrine, as it may precipitate convulsive seizures in such cases. The fourth chapter is concerned with drug resistance, both natural and acquired; it is considered in relation to the various cycles of the parasite, and its importance in treatment of the established infection in the individual and as a community problem is discussed. The last chapter deals with the clinical use of the antimalarial drugs. Emphasis is laid on the fact that dosage schedules are not rigid but are subject to a variety of factors, including the immune status of the patient, his age and body weight, the strain of parasite concerned and, in the case of proguanil or pyrimethamine, the existence of drug resistance. The vexations inherent in the divergent practices of manufacturers, whereby one markets tablets containing a stated quantity of a salt—without indication of the content of the base—while another markets tablets supplying the latter indispensable information, stress the desirability of uniformity in this matter. The synthetic antimalarials always should be prescribed in terms of dosage of the base. In view of the slow rise of these compounds to peak serum levels initial " loading " doses, to speed this rise, are of major importance. The general adoption of the practice of giving loading doses has been a material factor in enhancing the value of mepacrine and the 4-aminoquinolines which, prior to this practice, were held to be inferior to quinine in producing a quick response; quinine very quickly attains a high serum concentration and so loading doses are unnecessary, as well as undesirable on other grounds. It is indeed refreshing to see in a current authoritative publication that the prevailing tendency to decry quinine is not shared by the authors, who consider it to remain a remarkably safe and effective drug for the immediate treatment of an acute

infection. Its limitations in other directions and its possible dangers in very exceptional cases nevertheless are fully recognized. Quinine is still accorded pride of place in the arrest of grave *P. falciparum* infections, especially when it is given intravenously, but mepacrine should not be given by this route. Mepacrine can be given, it is said, reasonably safely by intramuscular injection—but there is no mention of the sterile abscesses which may follow; these abscesses differ but little from those following quinine injections in some cases. The selection and dosage of drugs for personal and collective drug prophylaxis and their limitations, are clearly stated.

Finally, much invaluable information is condensed into 4 short annexes; indeed consultation of these alone will, within a few minutes, supply the basic practical information needed by a doctor confronted with the treatment of a patient known to be suffering from malaria. Not the least useful of these annexes is a list of the synonyms of the 8 antimalarial drugs in general use throughout the world. At the end of the volume there is a selective bibliography relevant to each of the 5 chapters of the book. Wisely, the text is not clouded by citations from, or many direct references to, the literature. It is to this fact, and to the simple, direct, and logical manner in which the subjects are covered, that this small book owes its clarity. It admirably achieves its purpose—to provide factual information on the properties of antimalarial drugs—and it does so in a convincing manner readily comprehensible to anyone who may have occasion to seek information from its pages. The authors are to be congratulated on a production which should have the widest possible circulation among those who may have to treat any patient suffering from malaria. *A. R. D. Adams*

Barnard, Cyril C. [B.A., F.L.A., F.I.L.]. **A Classification for Medical and Veterinary Libraries.** 2nd Edition. pp. viii + 279. 1955. London: H. K. Lewis & Co. Ltd., 136, Gower Street, W.C.1. [£4.4.0.]

[This review appears also in the *Bulletin of Hygiene*, 1955, v. 30, 1033.]

Within 5 years of its publication in 1936 the whole first edition of Barnard's *A Classification for Medical Libraries* [this *Bulletin*, 1936, v. 33, 644] was sold out. Since then many would-be users of the scheme have been unable to obtain copies. In spite of this difficulty it has the distinction of being the only special medical scheme in use in all 5 continents. It is known to have been adopted already by 34 libraries of which at least 10 are general medical libraries, 5 are veterinary, 9 are in tropical countries, 7 are public health or hygiene libraries, and the remainder are libraries of a very highly specialized kind, *e.g.*, a trypanosomiasis research institute in Africa, and a research institute of a progressive firm of drug manufacturers. All report satisfaction with the scheme.

The classification as set out in the first edition was devised for use in a highly specialized library, that of the London School of Hygiene and Tropical Medicine, of which Mr. Barnard is the librarian. For this reason the Original Notation (a purely alphabetical one) is better suited to use in special libraries with a public health and parasitological, rather than a clinical, bias.

In the second edition this Original Notation is retained for use by such specialized medical libraries, but side by side with it a new Alternative Notation (distinguished by heavier type) is given which is designed to meet the needs of general medical libraries, thus greatly extending the possible uses of the scheme. The Main Schedules of topics (pp. 27–151) are the same whichever notation is used, but they have been thoroughly revised, brought up to date, and where necessary expanded. There are now some 3,000 topics

entered in the main schedules and allotted separate notations, as compared with less than 1,500 in the first edition. By the use of the appropriate auxiliary schedules, however, this number can be multiplied many times over.

In the first edition there was only one true Auxiliary Schedule, a Local List by which any topic, where appropriate, could be divided geographically. The second edition at pp. 152–213 gives 11 Tables of Auxiliary Schedules of common sub-divisions, *e.g.*, geographical, anatomical, pathological processes and conditions, therapeutic and surgical procedures, and subdivisions under parasites, micro-organisms, etc., and under drugs, poisons, minerals, etc. Each of these Tables has its own alphabetical index, and these form ready keys to all the symbols denoting subdivisions.

The Introduction at pp. 1–14 gives a detailed explanation of the Main Schedules and of the Tables of Auxiliary Schedules, with practical hints on the use of the scheme.

In revising the Classification Mr. Barnard has made as few alterations as possible in the original alphabetical notation, but he has not hesitated to introduce changes where necessary to make the scheme as perfect and up to date as may be. Users of the scheme in the old edition, wishing to adopt the present revised scheme, are given a Register of Changed Class-Marks at pp. 215–223 of the new edition.

The end two sections of the Classification are devoted to an Index of Parasites (pp. 227–236), which will enable books or pamphlets on a particular parasite to be quickly assigned to their appropriate place in the Classification, and to a detailed and most excellent General Index (pp. 239–279) which provides an indispensable key to the Classification, and will also be a valuable reference tool for classifiers, cataloguers, research librarians and others who are certain to find in it much medical terminology with which they are unfamiliar, and will welcome the clues it gives to anatomical and causal relationships, synonyms for diseases, and in some cases the French or German equivalents of English names of diseases.

Indeed, quite apart from its main use as a Library Classification, this volume may be confidently recommended as a reference work for students, or for those about to take up a special line of research. Its usefulness to a medical officer of health or to anyone wishing to arrange a private collection of books, reports, or reprints on public health, or tropical diseases, or parasitology, is obvious.

Mr. Barnard is to be congratulated on having provided an essentially practical and valid scheme of classification, ideally suited to the needs of a general medical library, a veterinary library, or a specialized medical library, and one that many medical librarians are likely to adopt now that it is made easily accessible in print. The whole volume clearly reflects the meticulous care, zeal and scholarship of its author, and is excellently produced, and a credit also to its publishers. *Robert L. Sheppard*

We record with great regret the death in Cape Town on 2nd September 1955 of J. F. C. Haslam, *C.M.G.*, *M.C.*, M.D., F.R.C.P. Edin., D.P.H., Assistant Director of the Bureau of Hygiene and Tropical Diseases from 1925 to 1930, who was responsible for the production of the *Bulletin of Hygiene*, the first number of which appeared in 1926.

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